

NATIONALGEOGRAPHIC.COM/MAGAZINE | JANUARY 2008

NATIONAL GEOGRAPHIC

Indonesia's
Ring of Fire

Volcano Gods

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I moved our whole family to Maine from Florida.
So I moved a piece of Florida to Maine.





Uprooting a tree



Putting down new roots

After the move, I bought a new couch



with

my Citi card. And a new rug.



5 lamps. And a

secondhand car with 4-wheel drive.



But here's the thing—my daughters Jen and Sadie hadn't

bought into the idea of moving to Maine. So since I

had uprooted them from all their friends, I had



the roots and everything else shipped 1,500 miles.

Now we have a little bit of Palm Beach, right off the

coast of Portland. **Whatever your story is, your Citi card**

can help you write it.

What's your story?



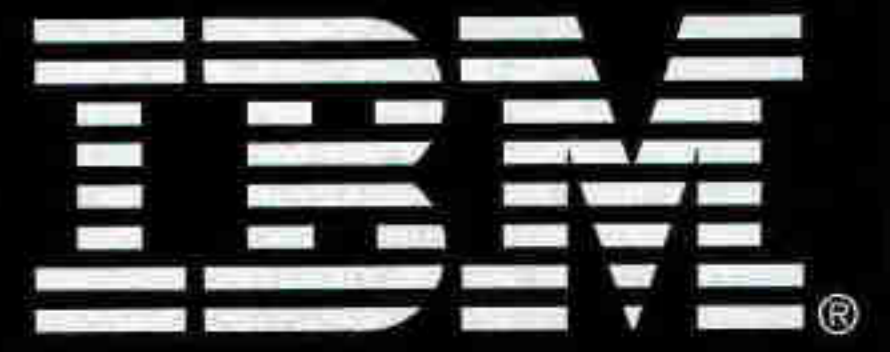
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EXPLORES HISTORY.
DOING
REWRITES IT.





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Sarus Crane
(*Grus antigone*)
Size: Head and body length, 152 - 156 cm (70- 72 inches); wingspan, approx. 240 cm (96 inches)
Weight: 6 - 8 kg (13.2 - 17.6 lbs)
Habitat: Generally found in grasslands, flooded rice paddies, wheat fields, marshes, lakes and pools
Surviving number: Estimated at 15,500 - 20,000

Photographed by Jagdeep Rajput

WILDLIFE AS CANON SEES IT

Love undying? The sarus crane is a fitting symbol of happy marriage, as pairs engage in complex, coordinated unison calling and strengthen their bonds through elaborate "dance" performances. Togetherness extends to the joint incubation of their eggs. Once the young are hatched, the primary role of the male is guarding the chicks against danger. The world's tallest flying bird faces a host of threats, however, which it is powerless against.

Ravaged by habitat loss, hunting, collecting of eggs and chicks, and collisions with power lines, populations have declined dramatically. That's far from happily ever after.

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NATIONAL GEOGRAPHIC

JANUARY 2008 • VOL. 213 • NO. 1

Abandoned homes of North Dakota's High Plains are known as see-through houses. On a cold January day, photographer Eugene Richards drove right past this one. But the forlorn frame drew him back. Story on page 140.



EUGENE RICHARDS

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BY TOM O'NEILL PHOTOGRAPHS BY BENOY K. BEHL
- The Emptied Prairie** **140** North Dakota ghost towns speak of an irreversible decline.
BY CHARLES BOWDEN PHOTOGRAPHS BY EUGENE RICHARDS

COVER The eruption of Java's Mount Merapi in May 2006 drove thousands of people from their homes. **PHOTO BY JOHN STANMEYER**

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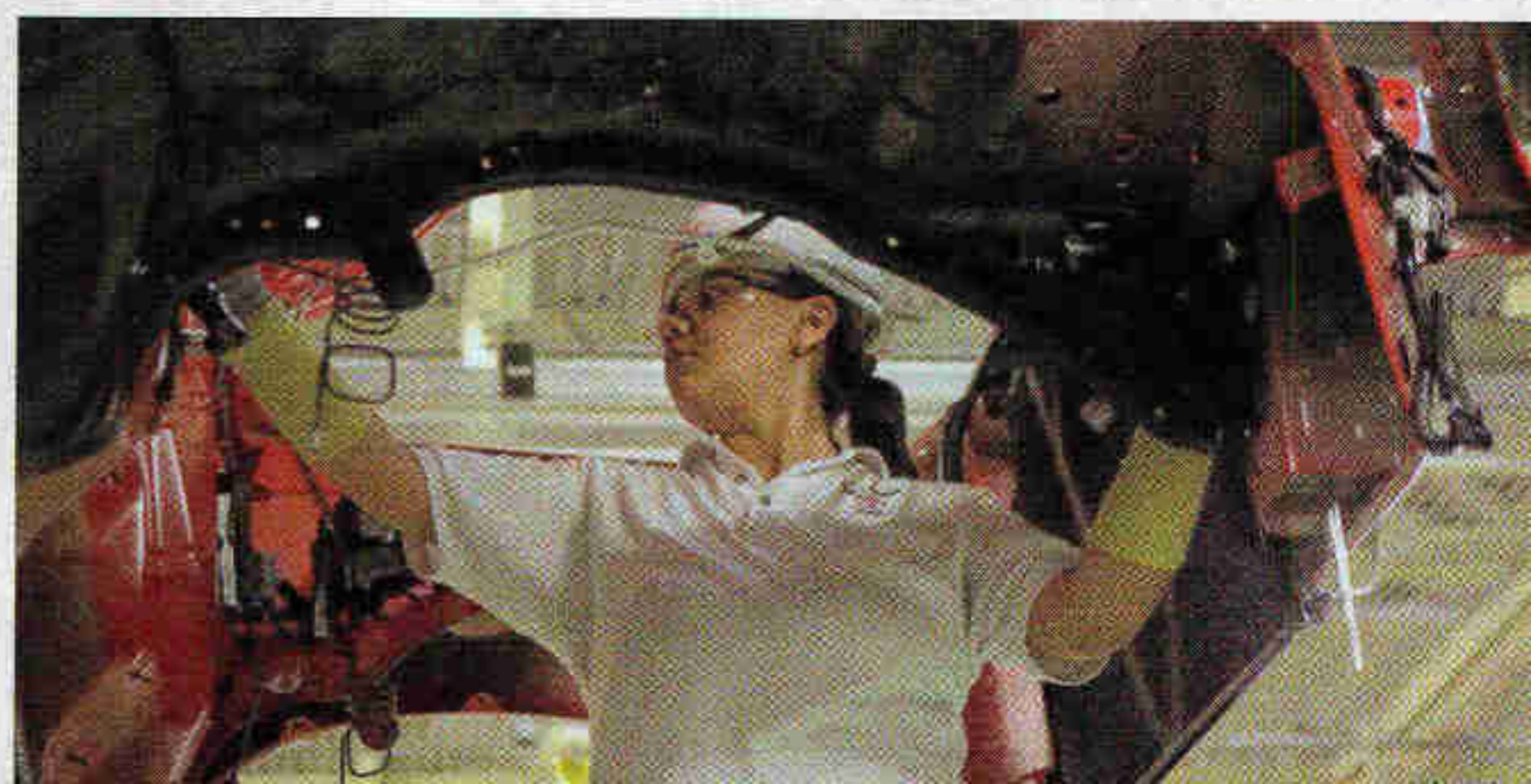
CAN A PICKUP GIVE 2,000 PEOPLE A LIFT?

WHY NOT?

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moving forward





Surfing Mavericks



The Politics of Adoption



Tambora Volcano

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Living With Volcanoes

John Stanmeyer's photographs document the passionate relationship Indonesians have with active volcanoes.

India's Sacred Masterpieces

Click on a map of India to view photographer Benoy Behl's images of rarely seen religious art and artifacts.

Keeping Up With the Climate

The latest reports from *Climate Connections*, a continuing collaboration between National Geographic and NPR, are posted at ngm.com/climateconnections and npr.org/climateconnections.

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on the planet is
a) a pack of wolves
b) a herd of cows

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Maurice Krafft's bootlaces are melting. Maybe I shouldn't be surprised. I'm standing with Maurice—a pioneer in the perilous business of filming volcanoes—on the crater floor of an erupting volcano in Tanzania.

The Maasai's sacred mountain, Ol Doinyo Lengai, is stirring. The crater floor bubbles with hot lava interspersed with cooling black and white lava. Maurice suggests walking on the safer, cooler, white areas, but visions of melting boot-



The Kraffts work in Iceland in 1973.

laces keep flashing in my mind. "It is not a worry," he says with his French inflection. "My boots just fell through into the hot red lava. Walk lightly." He offers to go first. It's a test of faith—but no one has better credentials to navigate the floor of an erupting volcano. Maurice and his wife, Katia, were often the first to arrive when volcanoes erupted around the world; over two decades they filmed more

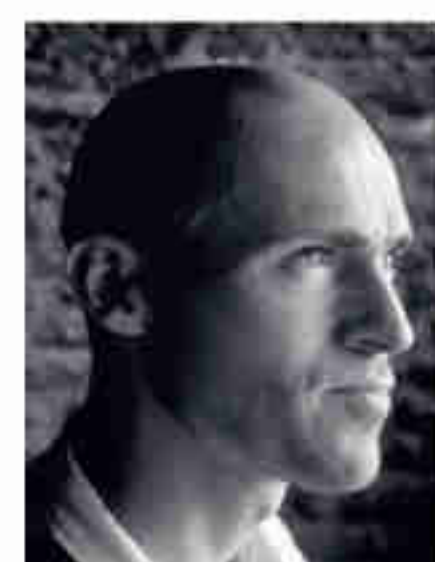
than 150 of them. We cross an infernal landscape punctuated with spewing lava. In a few hours, my bootlaces are melting too, but, like Maurice, I don't care. We camp on a dirt ridge for three days. The nights are breathtaking. The lava glows fiery red. The stars sparkle in the clear African sky. I know now why this 9,700-foot volcano is sacred to the Maasai. "Volcanoes are bigger than us," Maurice always said. "We are nothing compared to them."

In 1991 Maurice and Katia Krafft died while filming at Japan's Unzen volcano. A pyroclastic flow unexpectedly swept onto the ridge where they stood. "I am never afraid because I have seen so much eruptions in 23 years that even if I die tomorrow, I don't care," Maurice once said.

Indonesia—a place the Kraffts visited many times—is a volcano hot spot. It is also a place where volcanoes are a religion. This month writer Andrew Marshall and photographer John Stanmeyer discover how volcanoes have shaped that country's life and culture. "Volcanoes are the thrones of the gods," a Balinese tycoon told Marshall. The Kraffts showed us the view from those thrones.

PEOPLE BEHIND THE STORIES

■ **Andrew Marshall** Just a few of the experiences that made writing about Indonesia's volcanoes "slightly alarming," according to "The Gods Must Be Restless" author Andrew Marshall: interviewing Yogyakarta's chief seismologist in a room with walls cracked from a recent earthquake, breathing in a sulfur cloud, and



repeatedly driving in the opposite direction of signs urging residents to evacuate.

■ **Tommy Heinrich** "When I am not climbing, I am dreaming of climbing," says Tommy Heinrich, who shot "Ice Warriors," the story of a Polish team's ascent of Pakistan's



Nanga Parbat. This is the Argentine photographer's first assignment for *National Geographic*.

■ **Tom Zeller, Jr.** An editor at large with the *National Geographic* design and art team, Zeller joined the magazine staff in April 2007. He spent the previous nine years at the *New York Times*, where his roles ranged from business and technology reporter to graphics editor to blogger. Zeller, who wrote "Recycling: The Big Picture" for this issue,



has even recycled his blogging role. Find his latest dispatch at ngm.typepad.com/all_terrain.

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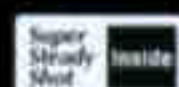
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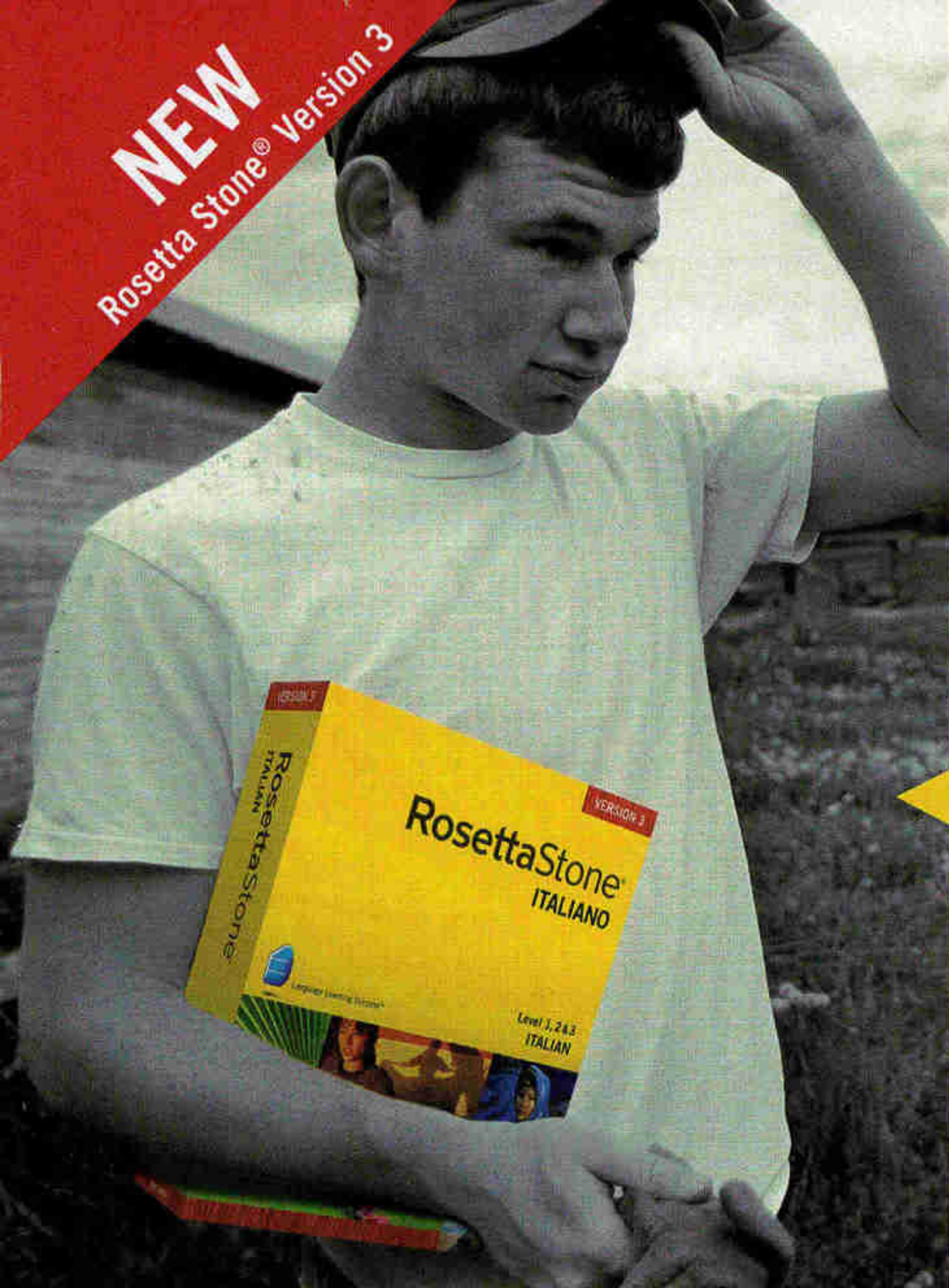
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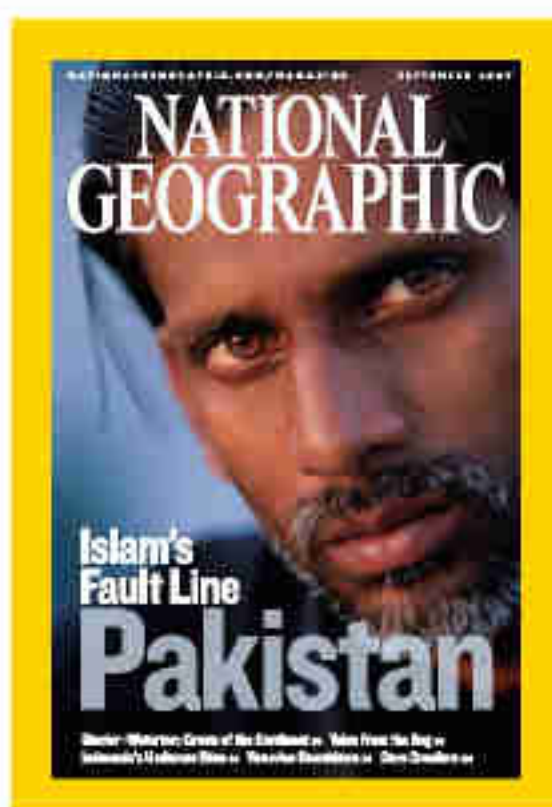
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September 2007 *“Struggle for the Soul of Pakistan” prompted four times as much mail as any story in the issue. Readers were especially moved by the work of humanitarian Abdul Sattar Edhi. Wrote Kylie Joy of Christchurch, New Zealand, “It is awe-inspiring to think that even in today’s society, flawed in many ways, there are people such as Edhi.”*

➤ Comment on January stories at ngm.com.

Pakistan

I was most interested in Don Belt’s analysis of the situation in Pakistan. I was there in May 2007. As a Westerner, I was never treated discourteously. I felt no restraints on where I could go, and no fear poking about back alleys. People were curious but kind; no one seemed interested in talking politics. I was able to visit a school and a women’s clinic in the Hunza Valley. As always, the kids were great! Somehow I missed the “true believers”—or they missed me. I was prepared for difficulties and experienced none.

JO RAWLINS GILBERT
Menlo Park, California

The situation in Pakistan evokes a sense of déjà vu: fire-breathing revolutionaries looking to undermine a corrupt state, ideological indoctrination of the young, would-be violent

revolution by a small but highly motivated cadre of dedicated militants. The last time around we called it Marxism. As then, this is a serious sociopolitical and economic conflict, not a religious matter. A jihadist is no more representative of Islam than a Bolshevik was of atheism. Unfortunately, like Marxism, jihadism feeds on ignorance, apathy, corruption, despair, and human suffering. Where those things are rampant, jihadists find fertile ground.

JOHN DIMARCO
Brampton, Ontario

Your analysis of the situation in Pakistan, especially the madrassas, is on target. The earthquake and its aftermath were probably a turning point in the shift of the broken education system from a secular to a religious ideology. This is a turning point in the geopolitical arena. Lack of education will fuel fundamentalism and terrorism. It is only a matter of time until kids who have no schools will be swayed by the madrasa system that will provide education, food, shelter, clothing, and stipends. It is hard to refuse such offers when there is no substitute.

SAMOON AHMAD
New York, New York

The September issue carried a touching story of a 16-year-old Pakistani girl, Najma, who was raped to intimidate her family. It was troubling to see that the usually sensitive magazine thought it fit to print the name and picture of the teenager. Would you have done the same while reporting the rape of 16-year-old Jane Doe from Connecticut? Irrespective of the status of the child in his or her native country, we need to adopt the same standards of coverage that we would for children in the United States.

KEDAR SHETYE
Palm Harbor, Florida

Publishing a rape victim’s real name and photograph raises serious issues, regardless of nationality. Our decision was made in consultation with Najma, her parents, and their legal counsel, and was supported by a research process that was extraordinary even by our high standards. We obtained court documents from Pakistan, including the medical report, which supported Najma’s version of events. Fully informed by the writer and photographer in the field, as well as given repeated opportunities to change their minds, Najma and her parents courageously asked that her story, including her real name and photograph, be published in hopes of ending this barbaric form of intimidation.

Those who are denied a fair deal seek it in their own way. Be it Taliban, communist, or French Revolution, the thread is the same.

ABDUR RAB
Rawalpindi, Pakistan

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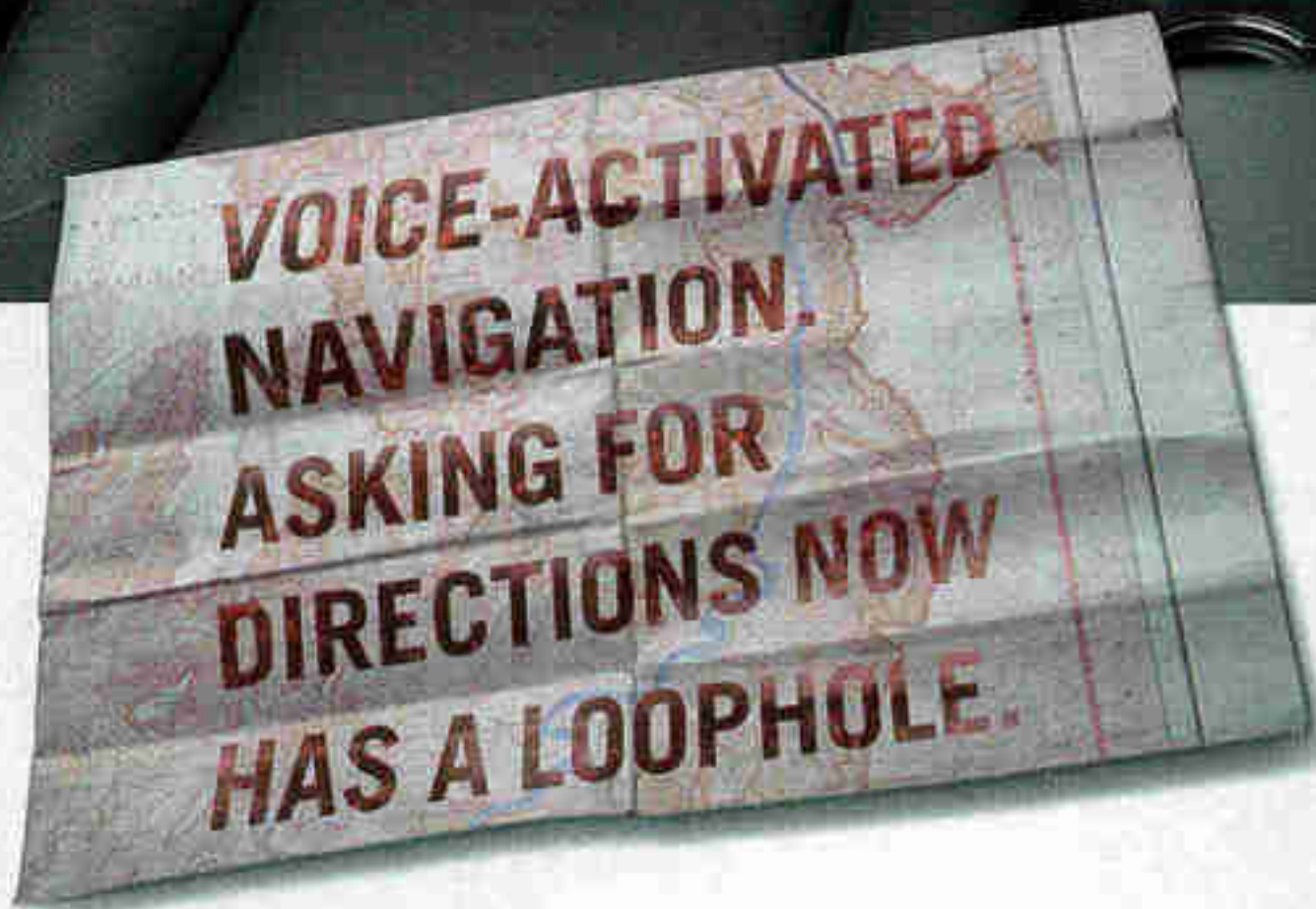
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LETTERS

It is fallacious to blame Islam for the present condition of Pakistan. The fact of the matter is that Pakistan never had Islamic law. The deplorable condition of that country is primarily from following non-Islamic laws.

AKHTAR MAHMOOD
Chandigarh, India

Your article on Pakistan highlights that the Taliban and al Qaeda were really made in America, although production was outsourced to South Asia. I don't mean that big, bad America beat up on Muslims, making terrorists into heroes. I mean our tax dollars funded and our CIA armed the rise of the mujahideen as a tool against the Soviet presence in Afghanistan. The rise of these tribal warriors to the level of international menace is the result of the priority we placed on fighting communism, no matter what evil we allied ourselves with in the process. Their agenda was not ours. In fact, they hated the Soviets because women were allowed to go to school and medical clinics were being built in the countryside—many of the same things they hate us for.

CHARLIE ROSENBERG
Milwaukee, Wisconsin

Whether or not President Musharraf does good for Pakistan or for the U.S., there will still be a rift between moderate and militant Islam. In the

Corrections, Clarifications

August 2007:

The Maya, Glory and Ruin

Teotihuacan was not the largest city in the world in A.D. 378. It was one of the largest.

history of Pakistan, there has either been a government too strong or too weak. That is why it is easy for the country to lose balance so easily. I have to agree with [human rights lawyer] Rashid Rehman's quote that when people are powerless, they are easily manipulated.

SREYONEEL BISWAS
Peoria, Illinois

Your article on Pakistan highlights that the Taliban and al Qaeda were really made in America, although production was outsourced to South Asia.

Tales From the Bog

My first impression from these striking photos was the precision braid of the leather cord and what appears to be machine-made stitching in the hat. Both seem to be all too exact. Likewise, the web-like slices in the shoes. Is it just me, or do these examples seem unlikely to be made with tools available 2,300 years ago?

SUSAN BATTISTA
Absecon, New Jersey

A sharp knife and a pointed needle were all that were necessary to craft such handiwork, according to Karen Boe of Denmark's Silkeborg Museum. She adds that our readers are "probably capable of making similar work," given the time and the tools.

It is not only Europe's bogs we should be concerned about. A few miles south of Vancouver, British Columbia, Burns Bog, known by many as the "lungs of Vancouver," is being threatened by plans to build a four-lane highway. Why do we need a four-lane highway? Our government wants to expand Deltaport to more than triple its size. This will mean more goods can be imported from Asia. On the edge of the bog is a winter roosting site for bald eagles. Migratory birds on the Pacific flyway will lose farmland needed to forage on as they fly south. Please help us save Burns Bog.

WILMA MacKAY HAIG
Delta, British Columbia

Vesuvius: Asleep for Now

Based on dates of eight major eruptions from 25,000 years ago to A.D. 79, you calculate "an interval of about 2,000 years between" the events. The actual average interval between the eight eruptions was 3,296 years. With the most recent of these occurring 1,928 years ago, there is considerable time left until the average is reached: 1,368 years. However, the intervals have ranged from as long as 5,500 years to as brief as 1,852, so the time from Pompeii until now does fall in the historical range, albeit close to the short end. I enjoyed the article. I wouldn't live in that neck of the woods myself.

JAMES DYCK
Meadview, Arizona

Our list did not include all the major eruptions of Vesuvius. We regret that this was not clear.



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LETTERS

Discoveries in the Dark

I enjoyed Kevin Krajick's article about the creatures in caves and aquifers. But his concern—"entire aquifers such as the Edwards are fast being drained, and as the water disappears, so does aquatic habitat"—is somewhat overstated. Unlike many aquifers, the Edwards limestone recharges in wetter years, storing water for dry years. In late August 2007, the reading at the Edwards aquifer Bexar index well was 700.1 feet above sea level, just below the 703.3 foot record. The low of 612.5 feet was in August 1956, the year after I moved to San Antonio at age six.

STEVE BRYANT
San Antonio, Texas

Although the Edwards aquifer is now at high levels, in the past low levels led to several aquatic species being put on endangered or threatened lists.

Science: Red Alert

Your brief article on redheads amused me. I believe your figures and predictions are skewed. You have obviously never visited Sand Mountain, a community of towns sitting on a plateau in northern Alabama. My husband and I moved here in 1993 and attended our first high school football game that fall. As I gazed around the packed stadium that night, I was amazed when I realized that almost every child and adult in attendance had "carrot top" hair. It is the norm here and not the exception. Most names here are Scotch-Irish, and people don't move far from the farm homes where they were born. The importation of jobs and industry has further enticed the population to stay. This redhead gene pool isn't going anywhere. It will thrive and provide DNA for many, many generations to come.

IMOGENE S. GRAY
Boaz, Alabama

I found the article "Red Alert" interesting. I've been a redhead all my life, but never knew I was part of an endangered species!

SARAH BROWN
Greenville, North Carolina

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SHOOT. CREATE. SHARE.



Photo Journal: Stephen Wilkes

Wilkes's pictures of the unseen Ellis Island struck a particular chord with me. I was once lucky enough to visit back in the early 1970s before any renovation had taken place. We got the full, hard-hat tour of the island. The ferry was still sunk in the boat slip. The main buildings and the great hall were barely hanging in there. But what struck me the most was, in fact, the hospital wing. I could almost feel the feet walking the halls and hear the whisper of many languages and the children's laughter. I ended up marrying a man who went with me on that tour so long ago. We have never been back, despite the fact

that we live nearby. But your pictures have inspired me. We will get there.

ANNE WESP
Centerport, New York

I've feasted upon your magazine for decades, but the September issue absorbs me and is especially stimulating. The story and photos about Ellis Island are both appalling and encouraging while restoration and acknowledgment about what happened there proceed. It is hard to countenance the immigrants who were denied admission while in sight of Manhattan and were returned to the old country, where despair was king.

VERNON L. STORY
Fullerton, California

Crown of the Continent

Having visited Glacier National Park almost yearly since 1968, I found the photos in your September issue absolutely stunning. Yet I must protest. The author asks if we will have to change the name to Glacierless National Park once the glaciers are gone. In 1968 and for many years beyond, rangers made it a point to emphasize that Glacier's name was based on the fact that it was formed by glaciers, not because it contained glaciers. But in today's global warming climate (pun intended) you hear more often than not that Glacier is losing its namesake. Is this what they mean by the politics of fear?

LORETTA PARK
Havre, Montana

THE HIGH-PERFORMANCE CYPHER® STENT.

The CYPHER® Sirolimus-eluting Coronary Stent

Patient Information for the CYPHER® Sirolimus-eluting Coronary Stent
(SY-fer sir-AHL-i-mus e-L UT-ing KOR-o-nair-e stent)

This summary is about the CYPHER® Sirolimus-eluting Coronary Stent, a combination product consisting of a device (stent) and an anti-rejection-type medication (sirolimus) contained in a polymer (soft plastic) coating on the stent. Please read it carefully. This information should not take the place of careful discussions with your doctor. Only your doctor can decide if the CYPHER® Stent is right for you. Contact your doctor if you have any questions.

WHAT IS THE CYPHER® STENT? The CYPHER® Stent has three parts:

The stent: a small, expandable, slotted metal tube that is inserted into a coronary artery (one of the blood vessels that supply the heart with oxygen and nutrients). A stent acts as a scaffold that helps hold the artery open, which allows blood flow to the heart and relieves symptoms caused by the blockage.

The anti-rejection-type medication (sirolimus): an anti-rejection-type medication that limits the overgrowth of tissue as the healing process occurs following coronary stent implantation.

The inactive ingredient: a polymer (soft plastic) coating on the stent that contains the medication sirolimus, and slowly elutes (releases) the medication into the artery wall around the stent.

HOW DOES THE CYPHER® STENT WORK? Overgrowth of tissue is believed to be a major factor responsible for renarrowing of the artery after stent placement. The CYPHER® Stent limits this overgrowth of tissue, which significantly reduces the chance of reblockage and the need for another procedure.

WHAT IS THE CYPHER® STENT USED FOR? The CYPHER® Stent is used to help open coronary arteries in people who have symptoms of ischemic disease (lack of blood flow to the heart) such as heart attack or angina, due to atherosclerosis (fatty substances such as cholesterol deposited on the inner lining of blood vessels).

Placement of the CYPHER® Stent is no different than the placement of a bare-metal (uncoated) stent. The CYPHER® Stent will remain in the vessel permanently.

WHO SHOULD NOT RECEIVE THE CYPHER® STENT? Patients who:

- are allergic to the anti-rejection-type medication (sirolimus)
 - are allergic to the polymers used in the coating
 - cannot take antiplatelet medication such as aspirin
 - cannot take anticoagulant medication (blood thinners)
 - have a blockage that the doctor decides will not allow complete inflation of the angioplasty balloon
- Women of childbearing age should be using effective contraception before they receive the CYPHER® Stent, and for 12 weeks after. Women who are nursing should discuss this with their doctor before receiving the CYPHER® Stent.

The CYPHER® Stent has not been studied for use in children.

WHAT OTHER MEDICAL ISSUES SHOULD I DISCUSS WITH MY DOCTOR? You should tell your doctor about any other medications (prescription or nonprescription) you are taking, especially medications that affect your immune system. You should also tell your doctor if you have a history of bleeding problems.

WHAT ARE THE POSSIBLE SIDE EFFECTS OF THE CYPHER® STENT? Use of the CYPHER® Stent carries the risks associated with all coronary stent placement, including allergic reaction, irregular heart rhythm, stent thrombosis (blood clot in the stent), death, reactions to antiplatelet or anticoagulant medications or to dyes

used during placement, emergency bypass surgery, fever, bleeding at the puncture site, chest pain or angina and stroke. The risk of thrombosis with any stent, uncoated or drug-eluting, remains low. Our two clinical trials following patients over a five-year period indicate a similar overall risk of thrombosis between the CYPHER® Stent and uncoated stents. However, after 1 year, a very small increased risk of stent thrombosis can be seen with the CYPHER® Stent versus uncoated stents that did not reach statistical significance.

Potential adverse events which may be associated with the implantation of a coronary stent include: allergic reaction, irregular heart rhythm, death, drug reactions to blood-thinning agents or contrast media, emergency bypass surgery, fever, bleeding at the puncture site, chest pain or angina, and stroke. Potential adverse events related to the drug sirolimus (based on studies of patients who used the drug orally for a prolonged period of time) include: infection, tumor formation, fatigue, joint pain and diarrhea.

Exposure to sirolimus and the polymer coating on the CYPHER® Stent is directly related to the number of implanted stents. Use of more than two CYPHER® Stents has not been adequately evaluated. Use of more than two CYPHER® Stents will result in your exposure to a larger amount of sirolimus and polymer coating than experienced in the clinical studies.

WHAT CAN I EXPECT AFTER I RECEIVE THE CYPHER® STENT? Many patients are able to return home the day following their procedure. Your doctor will decide how long you need to stay based on your individual needs.

Your doctor will prescribe aspirin, and other antiplatelet or anticoagulant medications (blood-thinners). It is very important that you take these medications exactly as directed; be sure not to miss any doses. Call your doctor if you feel that you cannot tolerate your medications or develop any side effects such as bleeding, upset stomach, rash or itching, or if another healthcare professional asks you to stop taking your medication. You may also have to have follow-up blood tests to monitor the effects of the CYPHER® Stent.

You should be able to return to your normal activities such as work, sports and sex very soon, but again, this will be determined by your doctor. Check with your doctor prior to doing anything that is physically strenuous.

You will be given a schedule for follow-up visits with your cardiologist or family doctor, and a small identification card to carry with you at all times, containing information about the CYPHER® Stent.

If you have chest pain after your procedure, see a doctor immediately.

HOW CAN I GET MORE INFORMATION ABOUT THE CYPHER® STENT? If you have any other questions, speak to your doctor, or call 1-800-781-0282 or visit www.cypherusa.com Sirolimus-eluting Stent made by Cordis Corporation pursuant to a license from Wyeth Pharmaceuticals.

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†Sirolimus is also available in tablet and liquid form, known by the name Rapamune.® Let your doctor know if you are currently using this medication.

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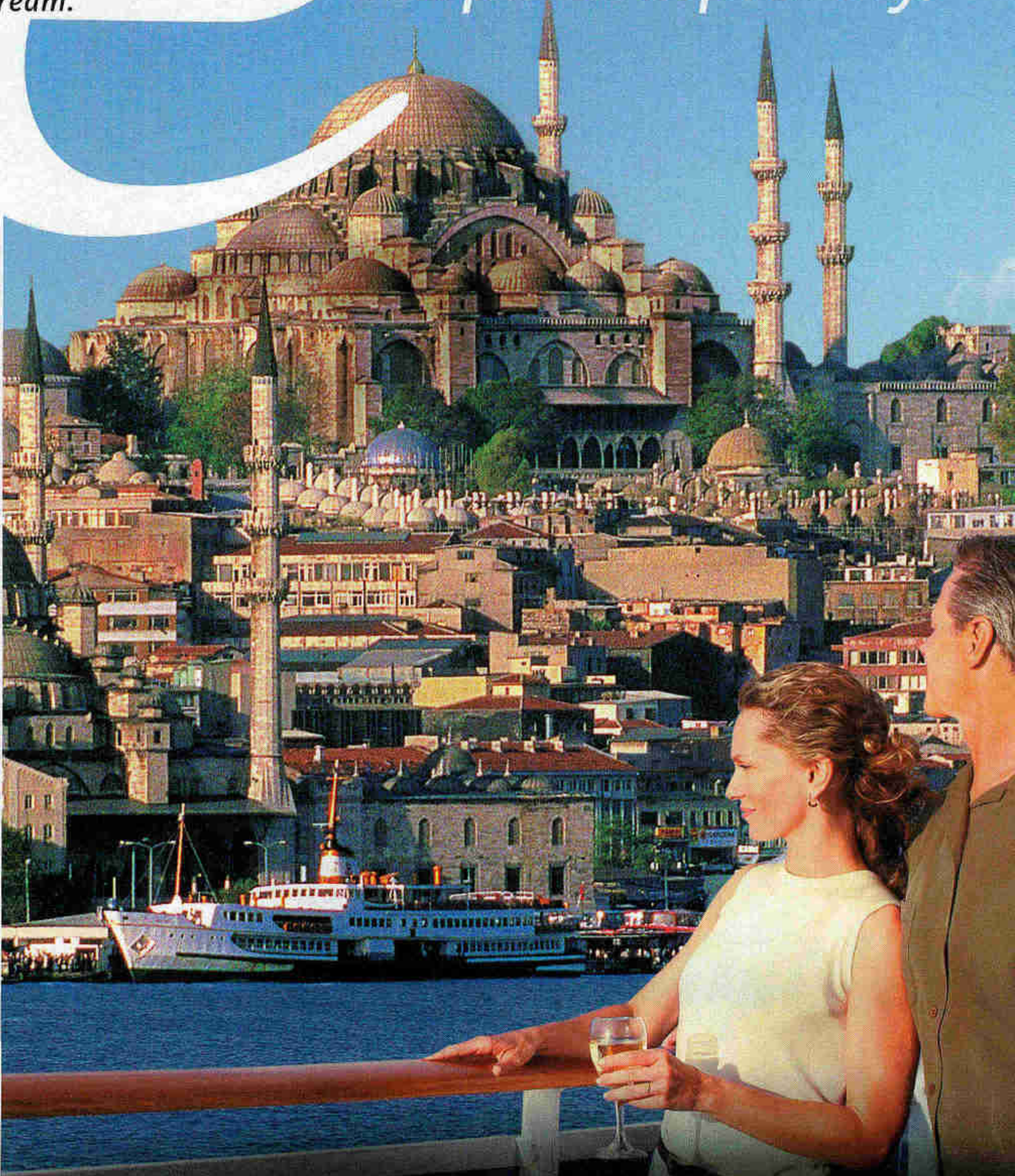
Ramon Rodriguez Garcia Killoscully, Ireland
Swirling fish surround a blacktip reef shark in a photo by Ramon Rodriguez Garcia. Honeymooning in the Maldives, the Madrid-born Web designer and his wife enjoyed watching the shark feed daily. "Well, I enjoyed it," he says.

Robert Jensen Los Angeles, California
He works in business administration, but Robert Jensen's heart is in the great outdoors. A photographer since age 15—and an entomologist by training—he spied this green lynx spider in Arizona.



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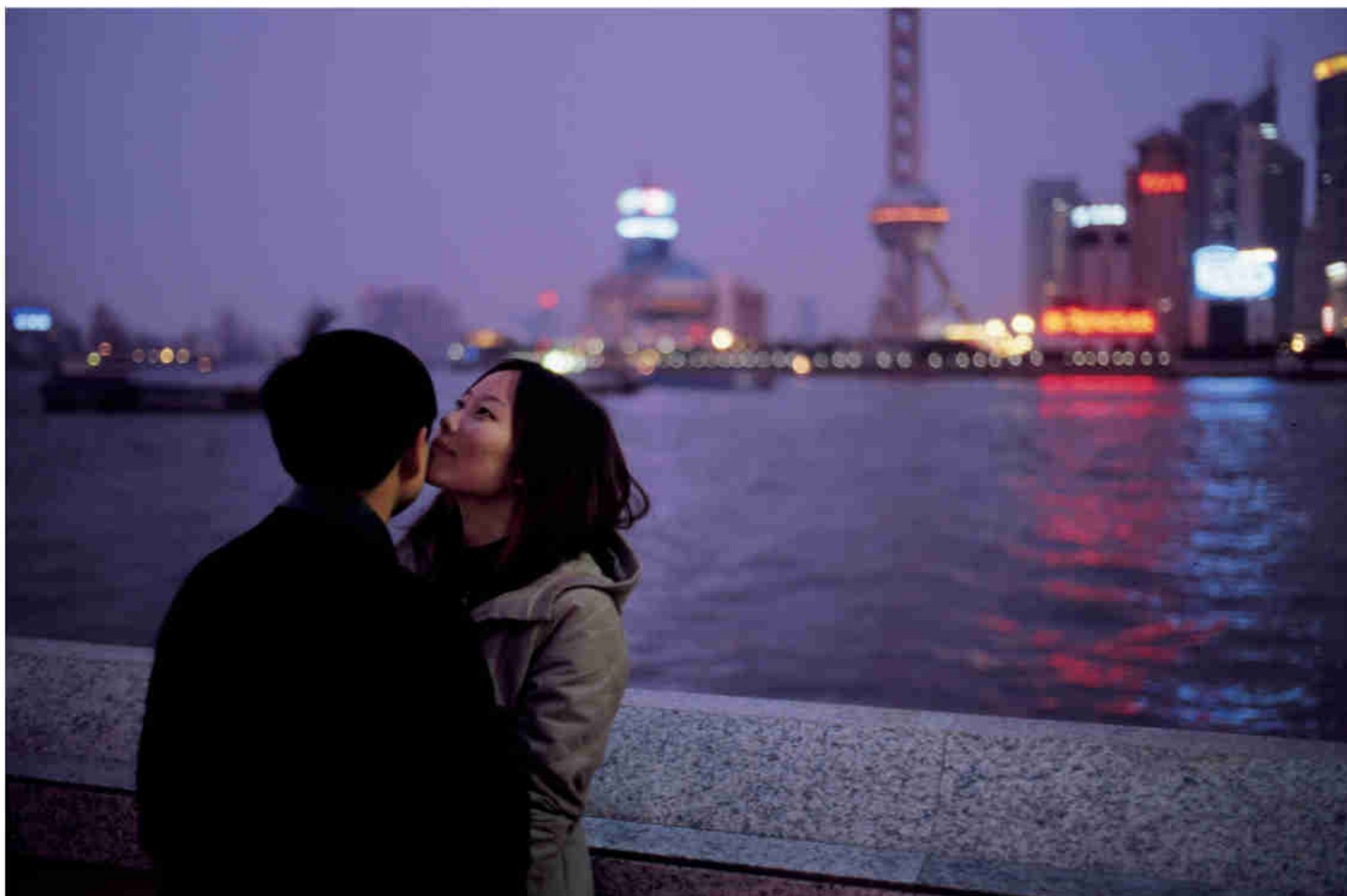
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With the district of Pudong for a backdrop, a Shanghai couple indulges in a moment of twilight romance.

California-based David Butow has covered the changing lives of China's young people, from Shanghai hustle in the east to the rural traditions of the Xinjiang Autonomous Region in the west.

Unprecedented China Dusk was settling over Beijing on October 1, 1999, as I slipped loose from the pack of foreign journalists corralled onto risers at one side of Tiananmen Square. Tens of thousands of students were unfurling flags and singing patriotic songs—part of massive celebrations honoring the 50th anniversary of the founding of the People's Republic of China. Their faces caught the slightly surreal glow of giant television lights, and—suspecting that any second I'd be spotted and herded back to the official pen—I began taking pictures furiously. I didn't know it then, but that was the beginning of my project on photographing China's young people.

The young are living with an almost boundless sense of possibility in China, and with some equally large anxieties. You see it most in big cities: Beijing, Guangzhou, Shanghai—where I photographed a young couple (above) clearly at ease with a public intimacy that would have been unthinkable just a generation ago. The country's breakneck economic growth is spinning off new opportunities: The proportion of 18- to 24-year-olds enrolled in college has doubled in less than a decade. And the government encourages individual ambition, as long as it doesn't run afoul of the central plan. But there are few role models for young people to emulate. A 25-year-old can't follow in the footsteps of a 45-year-old: The paths that the older person took are no longer on the map.

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Germany Three gray herons plus one fish equals a flapping squabble over property rights on the Baltic Sea island of Usedom. They might be wiser to look inland for dinner: Pollution has made some local fish unsafe to eat.

PHOTO: KONRAD WOTHE, MINDEN PICTURES



Czech Republic It takes a microscope to make a handful of carrot seeds look like a swarm of bristling space invaders. There are about 450,000 of these *Daucus carota* seeds in a single pound.

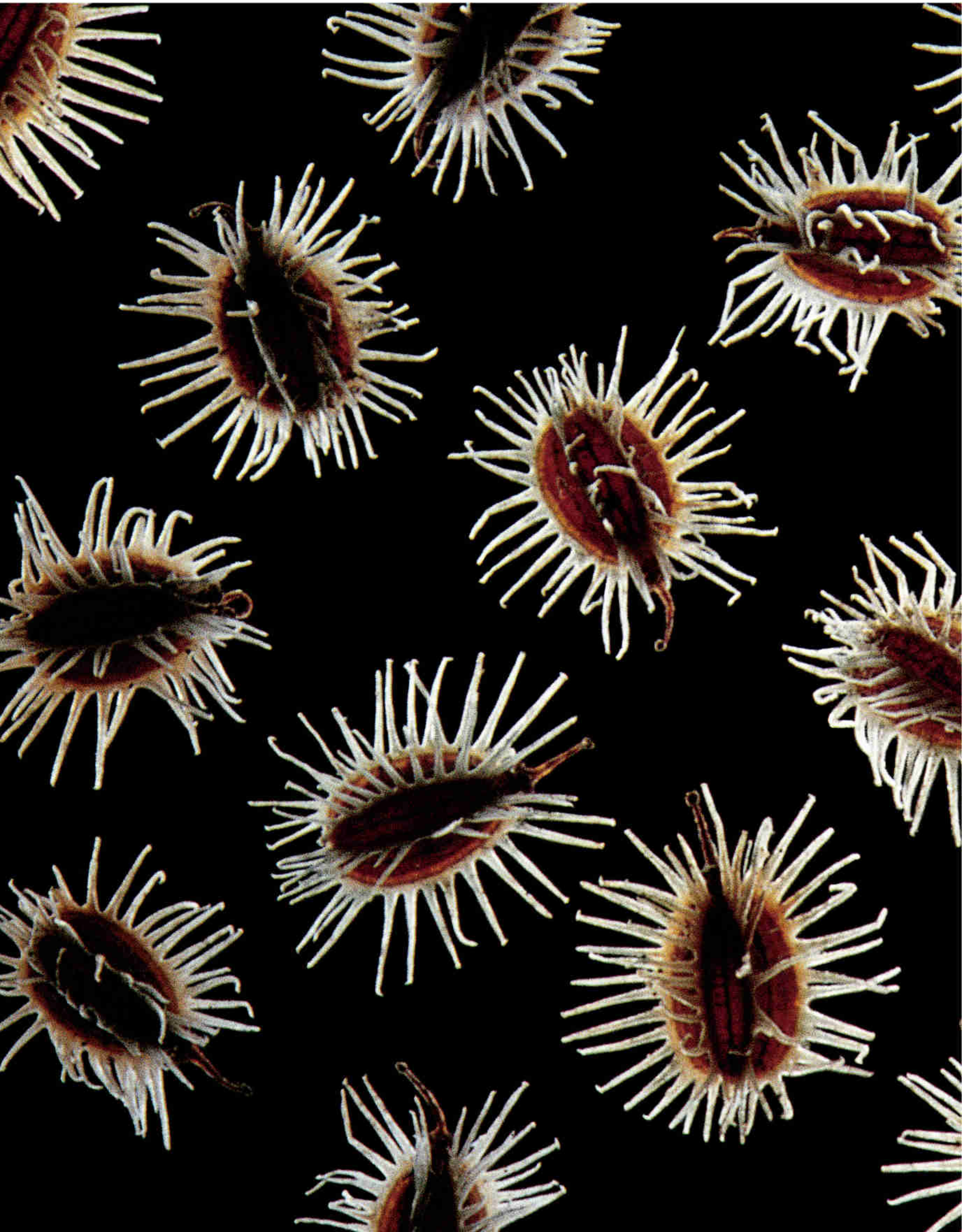


PHOTO: VIKTOR SÝKORA, CHARLES UNIVERSITY, PRAGUE



Azerbaijan The carcass of an abandoned amusement park ride is a diving platform for teens on a Caspian Sea beach near Baku. Despite the nation's oil and gas boom, almost half of Azerbaijanis live in poverty.



👉 See more Visions of Earth images at [visionsofearth.ngm.com](https://www.visionsofearth.ngm.com).

PHOTO: RÉMI BÉNALI, LIGHTMEDIATION





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Sports News

Wildcats Win a Wild One

SPRINGFIELD - The Wildcats beat the Rangers in a thrilling come-from-behind victory Saturday to win the District 5 championship. Down by one run in the final inning, Mike O'Malley smacked a clutch double to the opposite field scoring Austen Brown. O'Malley stole third and later scored on a throwing error.

The game started out as a pitcher's duel with only one hit per side through the first three innings. The Rangers finally put runs on the board in the fourth with a walk followed by back-to-back doubles. The Wildcats answered with a run in their next at bat. But that was all the scoring until the exciting finish.

The Wildcats outscored their opponents this season by a combined score of 108-19. The championship was only their second game of the year that wasn't called early because of the 10-run mercy rule.



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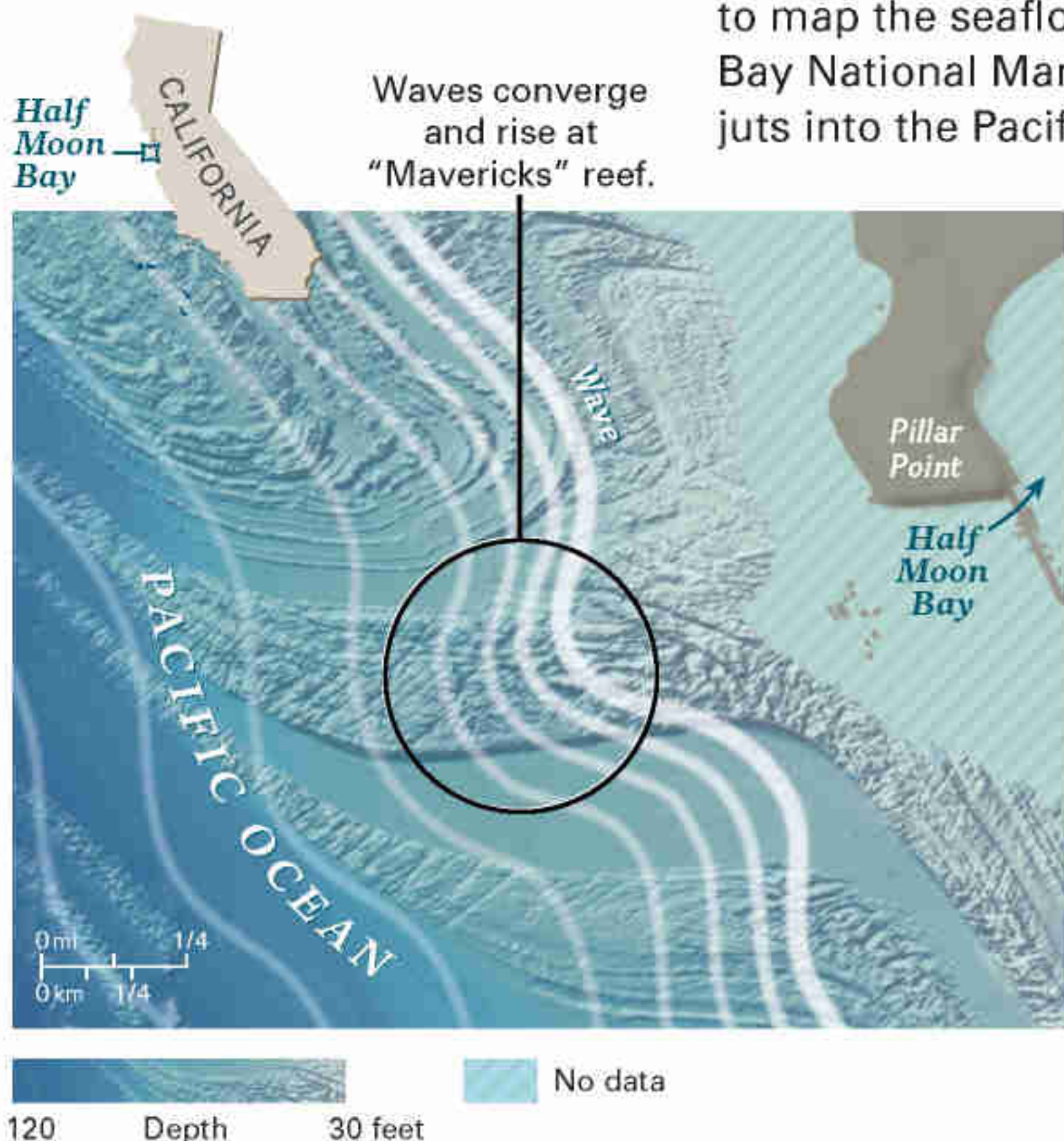


Surfer Matt Ambrose avoids the maw of a 30-foot wave at “Mavericks” in the finals of a 2006 contest.

Surly Surf Some of the largest waves to hit the mainland U.S. are at “Mavericks,” surfer slang for the treacherous rocky reef near California’s Half Moon Bay. Now scientists studying underwater geography and biology have discovered why. Funded by the California Ocean Protection Council, researchers used sonar to map the seafloor under the surf break—part of the Monterey Bay National Marine Sanctuary. It turns out a tongue of bedrock juts into the Pacific just below the surf zone. Intricate folds of eroded sandstones from the Tertiary period form stair-like ledges between deeper canyons. Waves race through those deepwater slots, then are bent by the reef, creating peaks 40 feet or higher during big swells. Gary Greene, a marine geologist on the project, notes the reef is popular with not only surfers but also overfished rockfish, making it a good candidate for a marine protected area.

Waves race through those deepwater slots, then are bent by the reef, creating peaks 40 feet or higher during big swells. Gary Greene, a marine geologist on the project, notes the reef is popular with not only surfers but also overfished rockfish, making it a good candidate for a marine protected area.

Matt Ambrose (above) often gets the rockfish-eye view, whether wiping out in monster surf or diving the reef on calm days. “Those [underwater] hills look like mushroom heads, undercut with cracks and caves,” he says. And the waves are tougher than any he’s ridden “by miles.” —Joel K. Bourne, Jr.



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The Politics of Adoption This year the map of international adoptions will be redrawn. The U.S., which adopts the most children from abroad, will be a full participant in the Hague Convention on Intercountry Adoption. The treaty regulates adoption among the 74 members and helps ensure that agencies comply with Hague rules, which call for counseling for adoptive parents and ban child



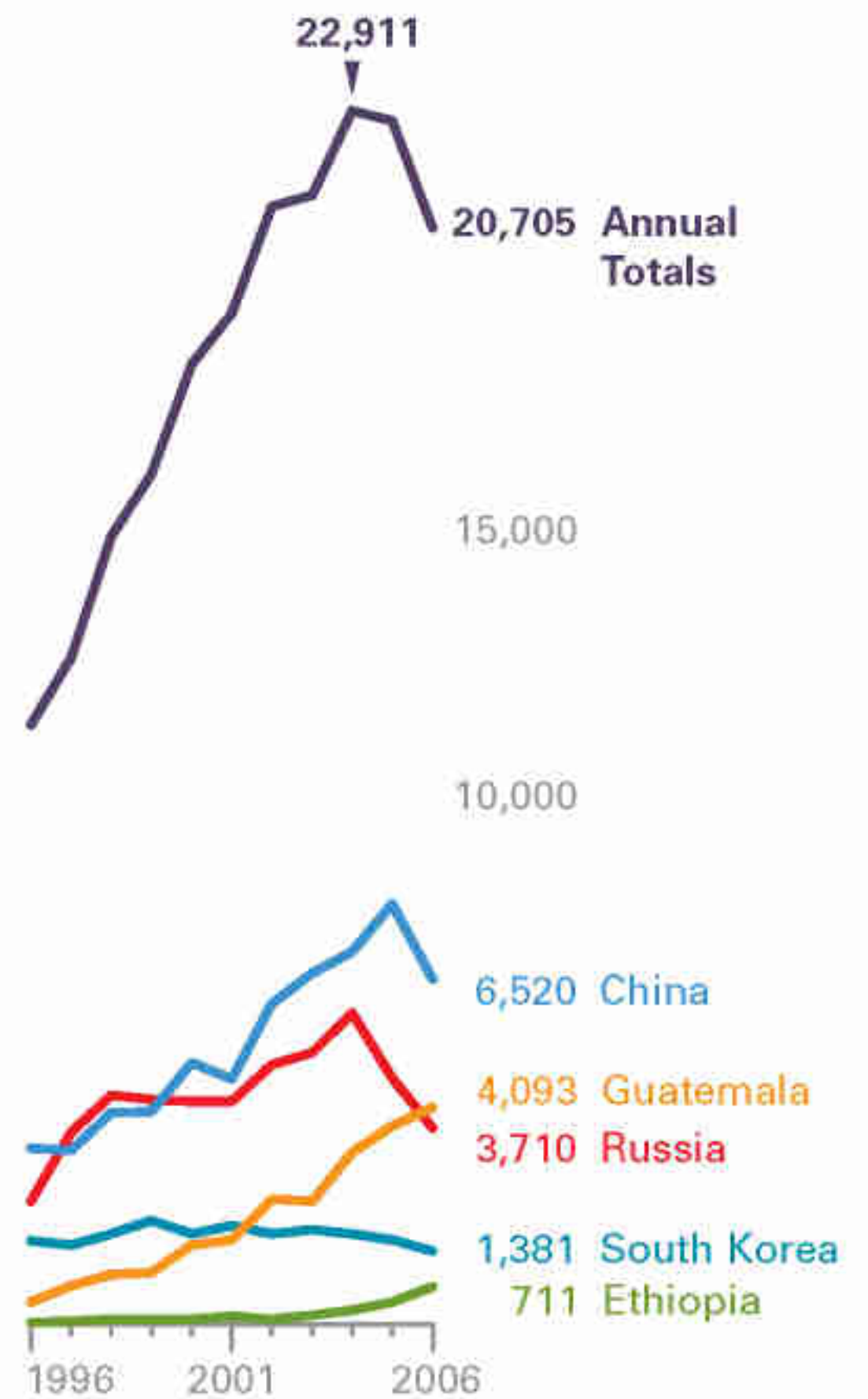
buying. That could be a problem for Guatemala, a mainstay of U.S. adoption for a decade. Although a Hague signatory, the country has been accused of child trafficking. Without reforms, adoptions could plummet. Tom DiFilipo

of the Joint Council for International Children's Services expects numbers to rise from other Hague participants—Colombia, for example.

Would-be parents are used to such changes. South Korea once topped the list, sending some 100,000 children to the U.S. from the '50s to the '90s. When the Cold War ended, Russia and former Soviet-bloc countries like Romania—infamous for its orphanages—opened to adoption. U.S. numbers soared. Romania closed its doors in 2001. Russia, with a dropping birthrate, now favors local families, as does China. For these and other reasons, U.S. numbers are sliding.

But one thing remains constant: Parents often embrace the culture of their new child. "I now know in my heart," says Ellen Rathfon, mother of two girls born in China, "we're a global community." —*Shelley Sperry*

Orphan Visas Issued by U.S., 1996-2006



So-called orphan visas are required for U.S. adoptees from other countries.

U.S. Adoptions of Immigrant Orphans, 2006

Top 20 countries of origin and numbers of adoptees



Hague Convention participant (as of October 2007)

AFRICA
ALASKA
ASIA & PACIFIC
AUSTRALIA
NEW ZEALAND
CANADA
NEW ENGLAND
CARIBBEAN
EUROPE
HAWAII
MEXICO
PANAMA CANAL
SOUTH AMERICA
WORLD VOYAGE



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Evocative

Quit It No wonder wannabe ex-smokers try many times before kicking the habit. Nicotine induces changes in brain structure believed to cause addiction. What's more, according to one study, from 1998 to 2004 U.S. tobacco companies upped the nicotine delivered in each puff by, on average, 11 percent. Addiction can come quickly: In a four-year study of 1,264 adolescents, of those who became hooked, one in ten showed signs within two days of first inhaling. Even smokers of relatively few cigarettes had withdrawal symptoms when deprived of nicotine. New medications may help. Varenicline blocks nicotine receptors to decrease the urge to smoke. The vaccine NicVax—now in clinical trials—pushes the immune system to make antibodies that keep nicotine from entering the brain. —*Diane Cole*



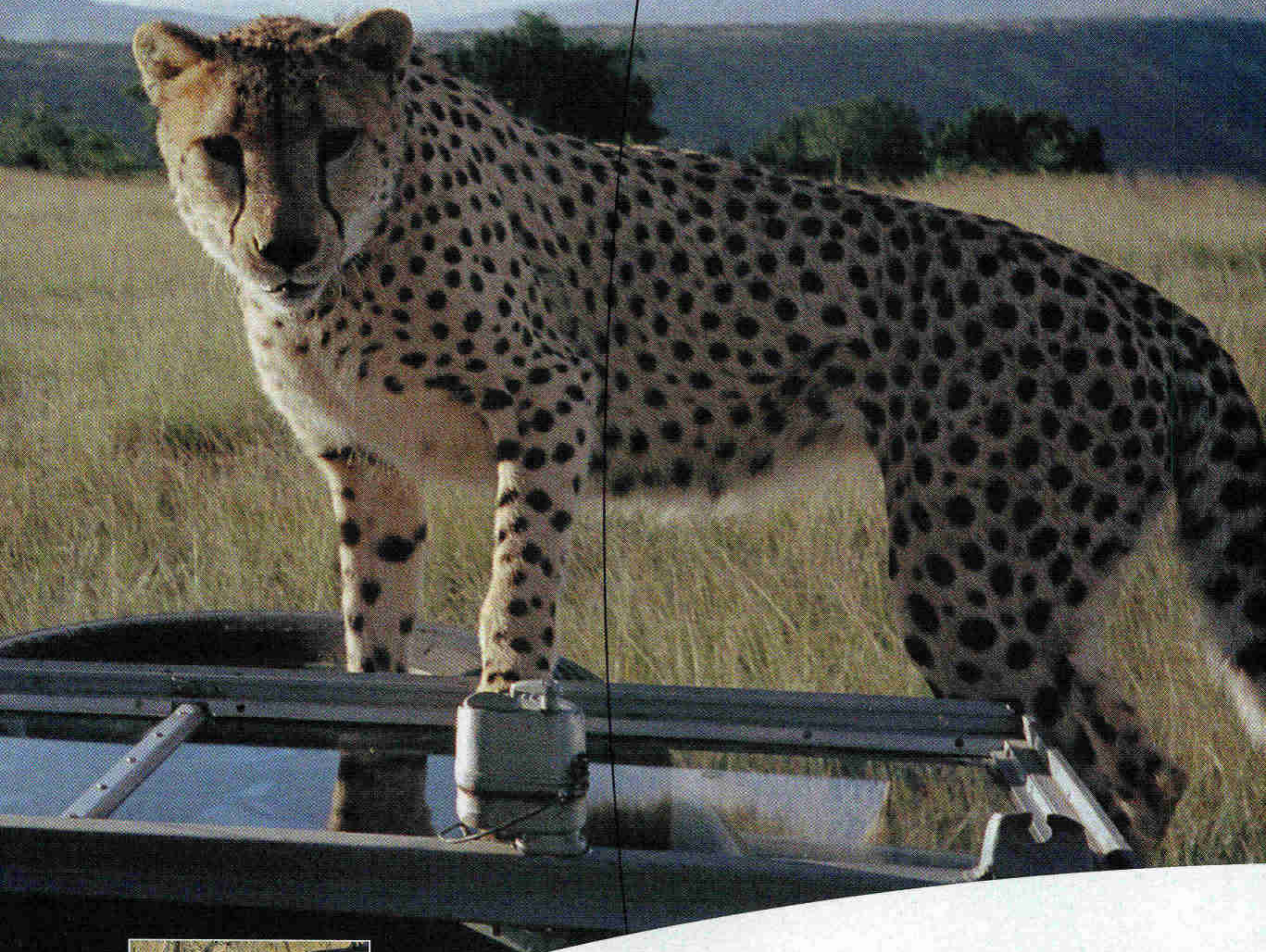
SMOKING SIGNALS

- Number of U.S. smokers:
1 in 5 adults (45.1 million)
- Yearly U.S. deaths caused
by smoking: **1 in 5 (438,000)**
- Smokers who quit for
at least a day each year:
19.2 million
- Percent who stay
tobacco free for three to
12 months: **5 percent**
- Benefit after one smoke-
free year: **Risk of coronary
heart disease is cut in half.**
- After 10 smoke-free years:
**Risk of lung cancer drops
by as much as half.**

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Bunnies on the Brink Eight years ago the smallest rabbits in North America were nearly extinct in Washington State. While pygmy rabbits live in several western states, the population in the Columbia River Basin has been isolated for thousands of years and is on the endangered species list. As the rabbits' sagebrush steppe habitat was converted to agriculture, their numbers fell; in 2001, fewer than 30 were known to live in the state. Biologists trapped 16 rabbits and began a captive-breeding program. But the one-pound pygmies couldn't make healthy babies, so Idaho relatives were imported to broaden the gene pool. Today about 80 live in captivity. On March 13, 2007, scientists released 20 rabbits, which scampered into drainage pipes that serve as temporary burrows. But by September, predators had eaten all except one. Biologists are thinking of ways to make a second release go better: for example, placing the rabbits in a fenced-off area or even getting rid of some of those wily coyotes. —*Helen Fields*



ADULT RABBIT, ACTUAL SIZE
Two-year-old Ivan was born at Washington State University.

PHOTO: RICH FRISHMAN. NGM MAPS. SOURCE: U.S. FISH AND WILDLIFE SERVICE

THE VAN ROCKS AGAIN



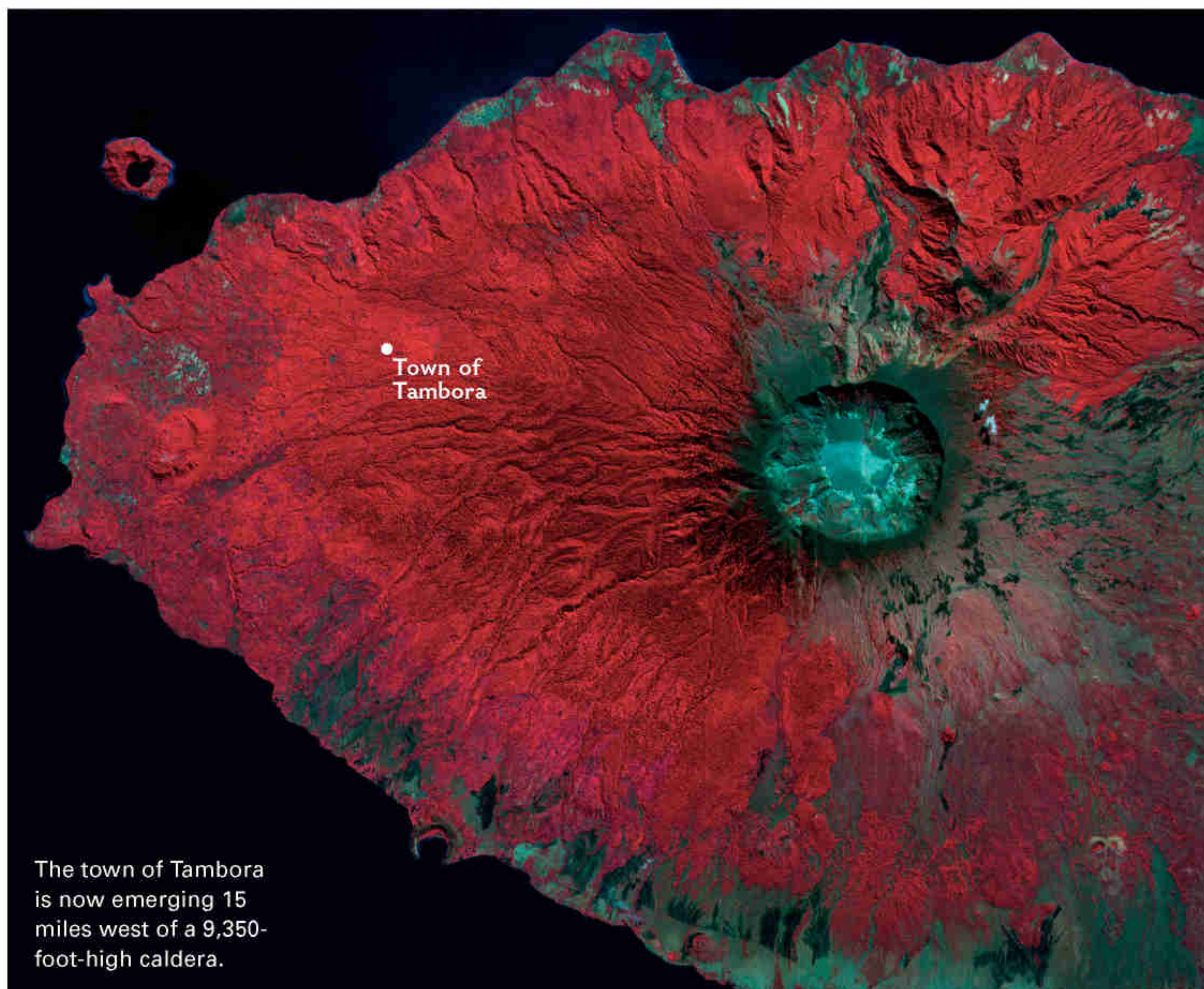
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1-800-33-Honda Touring model shown. Bluetooth-compatible with select phones. The Bluetooth word mark is a registered trademark of Bluetooth SIG, Inc. © 2007 American Honda Motor Co., Inc.



honda.com



The town of Tambora is now emerging 15 miles west of a 9,350-foot-high caldera.



NG GRANTEE Ash Cache A town buried by the largest eruption in recorded history is starting to see the light. The tale begins in 1815, on the Indonesian island of Sumbawa. Mount Tambora blew up, ejecting 20 times the rock that flew from Vesuvius in A.D. 79. Superhot ash and rock burned or buried all in its path, including the tiny kingdom of Tambora. Death toll: 92,000. Wind-blown clouds from the 27-mile-high plume dimmed the sun's rays. Crops failed worldwide. Sumbawa was largely uninhabited for decades.

The town of Tambora had been forgotten until locals in the 1970s found artifacts in an area cleared by loggers. Working with ground-penetrating radar, volcanologist Haraldur Sigurdsson, of the University of Rhode Island, has uncovered three stilt houses under ten feet of ash, several bodies, and objects that suggest surprising prosperity, including a miraculously intact ceramic pot (left). He will continue excavating: "This could be the Pompeii of the East." —Tom O'Neill



60

60 YEARS LATER,
HIS ACHIEVEMENT STILL REVERBERATES.

It wasn't just courage sitting in the cockpit with Chuck Yeager when he broke the sound barrier in October of 1947. It was two broken ribs, an intrepid, pioneering spirit and his Rolex Chronometer. His achievement was so remarkable, so top secret, that it wasn't until a year later that the rest of the world finally heard about it. Today, 60 years later, his feat still echoes.

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In space, vacuum-packed ramen will get a shot of hot water and ten minutes of heat.

Gastronauts Shrimp cocktail. Tortellini. Chocolate pudding cake! The International Space Station crew eats well, and soon they'll have even more choices. In late 2008 Japanese astronaut Koichi Wakata will blast off on Expedition 18 along with some 25 delicacies devised by the Japan Aerospace Exploration Agency for a test. His picks will later join the menu. Cooking space food is no small task—it must be shelf stable (no refrigerator up there), nutritious, and fit for zero gravity (salt and pepper are in liquid form as specks would float around). Food containers are fastened to trays. Astronauts sip liquids with a straw or dig into solids with forks and spoons. The new eats pose new issues. "For ramen," says Wakata, "I would definitely like to use chopsticks." —*Catherine L. Barker*



**LIVING IN THE
SHADOW OF
INDONESIA'S
VOLCANOES**

THE GODS MUST BE RESTLESS

Belching volcanoes such as Mount Semeru (background) and Mount Bromo (left) are portals to a subterranean world that shapes not only Indonesia's landscape, but also its beliefs and culture.

Inside the crater of Mount Bromo on the island of Java, men hoist baskets to intercept coins, vegetables, and live chickens—token sacrifices meant to appease the resident spirit during the Kasada festival. Prayers for prosperity accompany such offerings.





By Andrew Marshall
Photographs by John Stanmeyer

All hell is about to break loose,

but Udi, a 60-year-old farmer from the village of Kinarejo on the Indonesian island of Java, will not budge. Not even though a mere three miles separates the smoldering peak of Mount Merapi from Kinarejo. Not even though columns of noxious gas and the nervous tracings of seismographs signal an imminent explosion. Not even though the government has

ordered a full-scale evacuation. “I feel safe here,” he says. “If the Gatekeeper won’t move, then neither will I.”

Merapi is a natural-born killer. Rising almost 10,000 feet over forests and fields, it ranks among the world’s most active and dangerous volcanoes. Its very name means “fire mountain.” An eruption in 1930 killed more than 1,300; even in less deadly times, plumes drift menacingly from the peak. Some of the surrounding area, warns a local hazards map, is “frequently affected by pyroclastic flows, lava flows, rock-falls, toxic gases and glowing ejected rock fragments.” As the volcano’s rumbling crescendoed in May 2006, thousands fled the fertile slopes and settled reluctantly into makeshift camps at lower, safer altitudes. Even the resident monkeys descended in droves.

Not Udi and his fellow villagers, who take their cues from an octogenarian with dazzling dentures and a taste for menthol cigarettes: Mbah Marijan, the Gatekeeper of Merapi. Marijan has one of the more bizarre jobs in Indonesia, or anywhere else, for that matter. The fate of villagers like Udi and of the 500,000 residents of Yogyakarta, a city 20 miles to the south, rests on Marijan’s thin shoulders. It is his responsibility

to perform the rituals designed to appease an ogre believed to inhabit Merapi’s summit. This time, the rituals seem to have fallen short. The warnings grow more urgent. Volcanologists, military commanders, even Indonesia’s vice president beg him to evacuate. He flatly refuses. “It’s your duty to come talk to me,” he tells the police. “It is my duty to stay.”

Marijan’s behavior might seem suicidal anywhere else, but not in Indonesia, an archipelago of 17,500 islands that straddles the western reaches of the hyperactive Ring of Fire. It’s a zone of geophysical violence, a juncture of colliding tectonic plates that loops more than 25,000 miles around the Pacific. Geography has dealt Indonesia a wild card: Nowhere else do so many live so close to so many active volcanoes—129 by one count. On Java alone, 120 million people live in the shadow of more than 30 volcanoes, a proximity that has proved fatal to more than 140,000 in the past 500 years.

Death by volcano takes many forms: searing lava, suffocating mud, or the tsunamis that often follow an eruption. In 1883, Mount Krakatau (often misspelled as Krakatoa) located off Java’s coast, triggered a tsunami that claimed more than 36,000 lives. The name became a



Deep in a trance, Baryo, a Hindu holy man, blesses offerings bound for Mount Bromo. Mired in poverty, many Indonesians petition the land's volcanic powers for a better life.



It is Marijan's responsibility to perform the rituals designed to appease an ogre believed to inhabit Merapi's summit.

metaphor for a catastrophic natural disaster.

For Marijan, though, an eruption is not so much a threat as a growth spurt. "The kingdom of Merapi is expanding," he says, with a nod at its smoldering peak. In Indonesia, volcanoes are not just a fact of life, they are life itself. Volcanic ash enriches the soil; farmers on Java can harvest three crops of rice in a season. Farmers on neighboring Borneo, with only one volcano, can't.

On a less earthly plane, volcanoes stand at the heart of a complicated set of mystical beliefs that grip millions of Indonesians and influence events in unexpected ways. Their peaks attract holy men and pilgrims. Their eruptions augur political change and social upheaval. You might say that in Indonesia, volcanoes are a cultural cauldron in which mysticism, modern life, Islam,

Suplicants bear a litter laden with corn, cabbage, fake money, and a volcano-shaped offering (top). They will toss everything into a river to appease Mount Merapi, rumbling nearby. Inside a caldera near Mount Batur on Bali (bottom), residents care for a muslin-wrapped statue of stone and clay that they believe grows taller each year. Only the statue survived a fallen banyan tree that destroyed Pura Pancering Jagat ("temple of the navel of the world").

and other religions mix—or don't. Indonesia, an assemblage of races, religions, and tongues, is riveted together by volcanoes. Reverence for them is virtually a national trait.

If the Centre for Volcanology and Geological Hazard Mitigation, the government agency that keeps eight seismograph stations humming on Merapi, represents modern science, Marijan, the Gatekeeper of Merapi, is Indonesia at its most mystical. When a Dutch hiker went missing on the volcano in 1996, Marijan reportedly made the thick mist vanish and found the injured hiker in a ravine.

It is often hard to distinguish the kind of volcanic spasm that builds toward a convulsion from the seismic restlessness that settles back into quiescence. But monitoring technology has grown more sophisticated. Overnight,

government volcanologists have raised the alert to its highest level. The lava dome might collapse at any moment. Hasn't Marijan heard?

The entreaties leave Marijan unimpressed. The alerts are merely guesses by men at far remove from the spirit of the volcano. The lava dome collapse? "That's what the experts say," he says, smiling. "But an idiot like me can't see any change from yesterday."

INDONESIA'S MOTTO, "*Bhinneka tunggal ika*—Unity in diversity"—speaks to some 300 ethnic groups and more than 700 languages and dialects. The government officially recognizes six religions: Islam, Catholicism, Protestantism, Buddhism, Hinduism, and Confucianism, but mysticism riddles all faiths and bares their animistic roots.

Sumatra, the vast island northwest of Java, is home to the Batak people, converted to Christianity by European missionaries in the 19th century. Yet many still believe the first human descended from heaven on a bamboo pole to Mount Pusuk Buhit, an active volcano on the shores of Lake Toba. The Tengger, Hindus who live around Mount Bromo in East Java, periodically

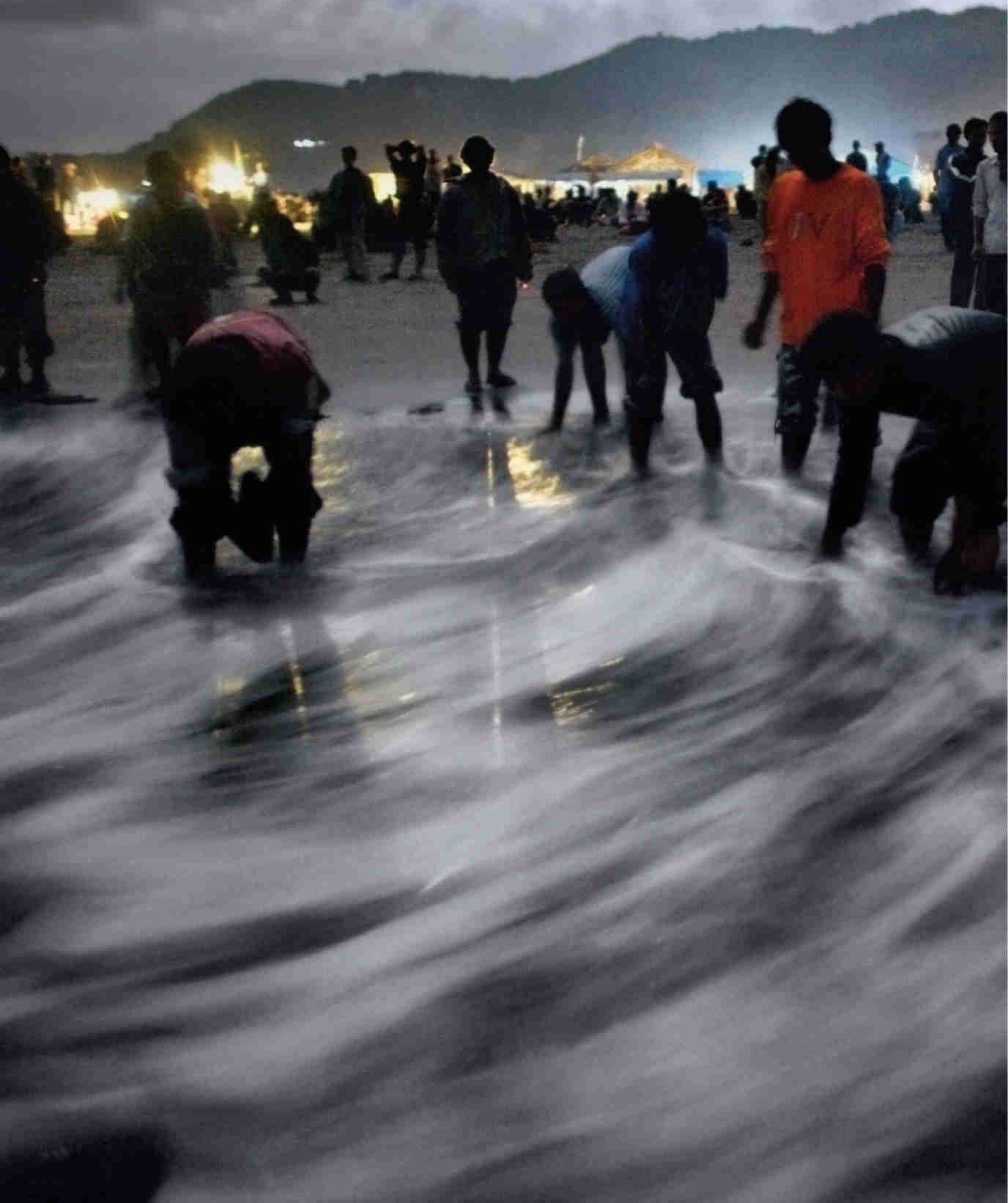
climb through choking sulfurous clouds to throw money, vegetables, chickens, and an occasional goat into the crater. On Flores, the Nage, Catholics like most on that island, are buried with their heads toward Mount Ebulobo, whose cone fills their southern horizon.

Likewise, on largely Hindu Bali, volcanoes are sacred, none more so than 10,000-foot Mount Agung, its highest peak. It is said a true Balinese knows its location, even when blindfolded, and many sleep with their heads pointing toward it.

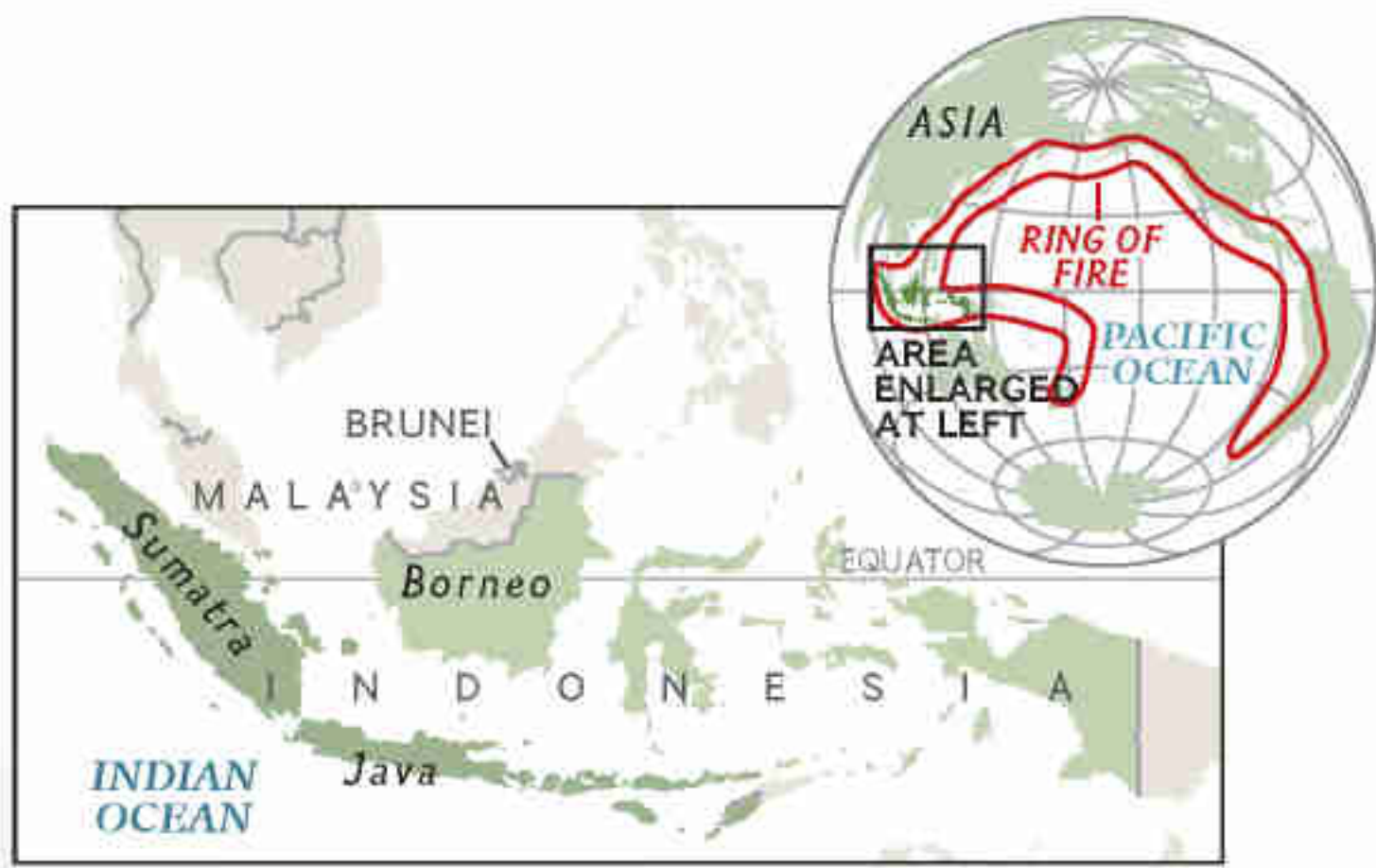
In 1963 a catastrophic eruption of Mount Agung killed a thousand people. Others starved

Andrew Marshall is a British journalist and the author of books about Japan and Burma. He lives in Bangkok. Photographer John Stanmeyer is based in Bali. He is co-founder of the photo agency VII.

Gathering *kantil* flowers that others cast prayerfully into the sea, some of Java's Muslims celebrate in a festival on Parangtritis beach, where revelers and prostitutes reenact a myth in which a sultan and a sea goddess trysted on a beach near Mount Merapi.










to death after ash smothered their crops. “The very ground beneath us trembled with the perpetual shocks of the explosions,” wrote an eyewitness. Yet what once was spoken of as divine wrath is now seen as a gift. The rock and sand thrown up by the eruption built hotels, restaurants, and villas for hordes of foreign tourists, who started arriving in the 1970s. Despite attacks by Islamic terrorists in 2002 and 2005, which killed more than 220 people, tourism remains Bali’s biggest industry. And by the grace of Agung and its neighbor, Mount Batur, houses that once nestled in fields of chilies and onions now overlook quarries filled with workers shoveling volcanic sand into trucks.



RINGED WITH FIRE

Indonesia and its 245 million people sit atop the western reaches of the Ring of Fire, a zone with volcanoes and frequent earthquakes. Mount Tambora killed 92,000 people when it erupted in 1815.

-  Volcanic activity since 1600
-  Population density of 1,200 persons per square mile and greater
-  Population density of 650 to 1,200 persons per square mile

SOURCE: OAK RIDGE NATIONAL LABORATORY LANDSCAN 2004; VOLCANOLOGICAL SURVEY OF INDONESIA
 BATHYMETRIC RELIEF BY JOHN A. BONNER
 JEROME N. COOKSON AND MARGUERITE B. HUNSIKER, NGM MAPS

Not everyone has been lifted by the rising tide of tourism. Seven hundred people in the village of Trunyan squeeze into a mountain stronghold near Mount Batur. Their ramshackle houses cling to a sliver of land along a lake in a vast caldera. The villagers fish in dugout canoes and grow crops on the steep shoulders of the caldera. The village's creation myth explains its isolation, telling how a wandering Javanese nobleman fell in love with a goddess who lived in a giant banyan tree. She agreed to marry him, but only if he covered his tracks so nobody else could follow him from Java.

While tourism has brought breakneck development to the rest of Bali, Trunyan's cherished isolation now spells economic marginalization. Elders watch helplessly as a younger generation traces the same path to Bali's towns and cities as Batur's rock and sand. "There are no jobs here, no opportunities," admits

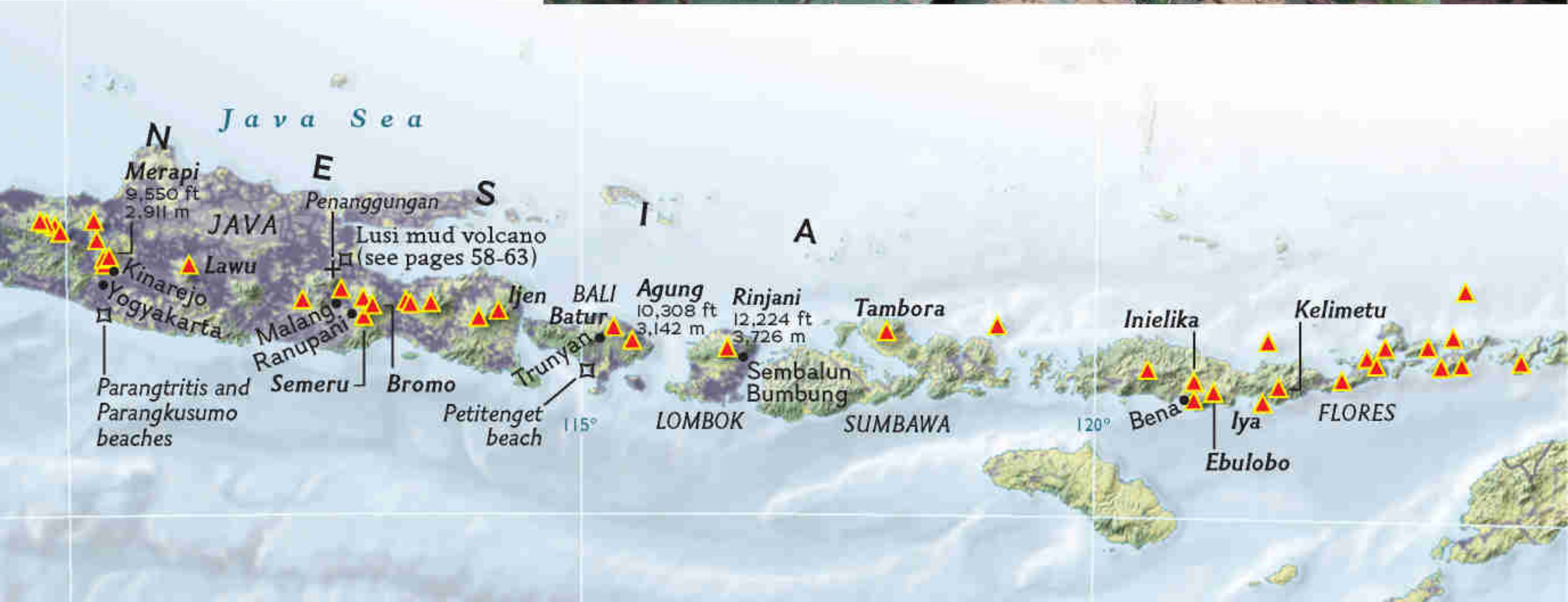
Made Tusan, a teacher at Trunyan's only school.

As if economic malaise weren't enough, a recent catastrophe added to the litany of woes. A giant banyan tree that had shaded the village for centuries crashed to the ground during a storm, flattening the village temple, though miraculously sparing the holy statue of Dewa Ratu Gede Pancering Jagat, the local deity.

A village elder, I Ketut Jaksa, blames the disaster on Balinese politicians and businessmen. He "won't name names," he says guardedly, but he insists they angered the volcano deity by praying to advance their careers while ignoring Trunyan's growing disrepair. Others blame the new road, which recently connected the village to the rest of Bali, destroying its isolation and leaving it open to spiritual contamination.

IN INDONESIA, it's a given that human folly can trigger natural disasters. Eruptions, earthquakes,

Ashfalls can suffocate plants and poison livestock. But in the long-term the ash is a boon to crops such as cauliflower, enriching the soil with minerals.





Villages speckle the slopes of Mount Merapi (left), where fertile land lures farmers into a volcanic hazard zone. Although volcanic soils cover just one percent of the Earth's land surface, they support roughly 10 percent of its population.





Geography has dealt Indonesia a wild card: Nowhere else do so many live so close to so many active volcanoes.

even a toppling banyan tree, have long been regarded as cosmic votes of no-confidence in a ruler—a fact of which the country's president, Susilo Bambang Yudhoyono, is painfully aware.

Two months after the president's inauguration in October 2004, an earthquake and tsunami struck Aceh Province on Sumatra, claiming 170,000 lives. A quake hit Sumatra three months later, killing perhaps 1,000. Then Mount Talang erupted, forcing thousands of villagers to flee their homes. A chain text message flashed across cell phones, imploring Yudhoyono to perform a ritual to stop the calamities. "Mr. President," it read, "please sacrifice 1,000 goats." Yudhoyono—a former general with a doctorate in agricultural economics—publicly refused. "Even if I sacrificed a thousand goats," he

Back from the harvest, Haji Nursasih carries sacred red rice to the village of Sembalun Bumbung. According to local legend, Dewi Anjani, the spirit of Mount Rinjani (top, background), gave a sacred spear to the village's first inhabitants, who pierced the ground with it, miraculously bringing forth a field of rice. In a sacred pool on the slopes of Mount Penanggungan, men bathe beside statues of Sri and Lakshmi, the consorts of the Hindu god Vishnu.

announced, "disasters in Indonesia will not end."

They didn't. There were more eruptions—a statistical certainty in the volcano-studded country. One catastrophe followed another: a quake, a tsunami, floods, forest fires, landslides, dengue fever, avian influenza, and a mud eruption (see page 58). Trains derailed, ferries sank, and after three major plane crashes—one at Yogyakarta airport—an editorial in the *Jakarta Post* advised air travelers to pray.

The streak of tragedy haunting the president could be explained, it was said, by his inauspicious birth date and by the name of his vice president, Jusuf Kalla, which bore an unhappy resemblance to that of a man-eating monster called Batara Kala. Amid renewed calls to perform a ritual to dispel the run of bad luck, President Yudhoyono and his cabinet joined a mass

prayer at Jakarta's grand mosque. "Nothing unusual," insisted his spokesman, but the high-profile gathering was clearly meant to allay national fears.

Other politicians appeal directly to the spirits. Before running for vice president, one candidate sneaked off to worship at a volcano near Lake Toba, where there is reportedly a helipad for visiting VIPs. The spirits must not have been listening: He was defeated. Another time, members of the Indonesian National Unity and Fusion Party gathered high on Merapi's slopes for a ritual-laced political rally, even though the volcano was on the brink of erupting. Led by Arief Koesno, a portly ex-actor who believes he is the reincarnation of Indonesia's first president, Sukarno, the ceremony started with the slaughter of nine goats and ended with party members dancing wildly in a circle.

"After this ceremony," Koesno declared, "I am certain Merapi will not erupt."

Three days later, it did.

In the smoking caldera of Indonesian politics, belief in the supernatural persists among even the most modern, high-ranking leaders. "Indonesian politicians are hypocrites," says Permadi, a professional soothsayer and member of parliament. "They say they believe in Islam, in the Holy Koran. They also claim to be rational, because many are educated in America. But in their hearts, they still believe in mysticism."

Even President Yudhoyono, claims Permadi, has conducted a ritual atop Mount Lawu, a revered Javanese volcano. The persistence of mysticism also explains why, when campaigning for office, many politicians make it a point to pay their respects to Mbah Marijan, the well-connected Gatekeeper of Merapi.

AS THINGS HEAT UP around Merapi, dozens of reporters flock to cover the standoff starring the immovable Marijan, Merapi's first media-age





Balinese Hindus perform a purification ritual on Petitenget beach. The ceremony, called Melasti, is intended to reconcile the spirits of the volcanoes and the oceans. The men become vessels for the gods' soldiers, pantomiming invincibility.



Before running for vice president, one candidate sneaked off to worship at a volcano where there is reportedly a helipad for visiting VIPs.

Gatekeeper. Soon, his face and the words “President of Merapi” adorn T-shirts all over Yogyakarta. To raise funds for his impoverished Kinarejo neighbors, he appears in a television advertisement for an energy drink.

Marijan, who inherited his job as Merapi’s caretaker from his father, is paid the equivalent of a dollar a month by the *kraton*, as the sultan’s high-walled palace in Yogyakarta is known. In traditional Javanese cosmology, the *kraton* sits on an invisible line between Mount Merapi and the nearby Indian Ocean. The sultan, a palace publication explains, is a “divinely chosen person” whose coronation is preceded by “a supernatural message.” Along with the everyday business of governing Yogyakarta, the sultan is also responsible for placating a powerful

Life’s primal forces are close at hand in Bena, on the island of Flores, where homes shaped like volcanic cones stand beside megalithic gravestones (top). At a funeral on the island of Lombok (bottom), mourners place mud balls, called *luhluh*, inside the grave of family member Ahmad Sukarnom. The Wetu Telu—a Muslim people who maintain some animist traditions—believe *luhluh* seal in the smell of a dead body so it will not disturb the spirits of Mount Rinjani.

sea goddess called Ratu Kidul, and Merapi’s guardian ogre, Sapu Jagat.

One morning, soldiers arrive. “I don’t want to leave,” Marijan tells them with all the firmness his creaky voice can convey. “Maybe I’ll leave tomorrow. Maybe the day after tomorrow. It’s up to me.” Then he heads for the village mosque. Marijan’s duties may include mollifying a volcano-dwelling ogre. But he is also a devout Muslim who prays five times a day.

Two days later, the lava dome collapses. Traffic grinds to a halt in downtown Yogyakarta as motorists gape at the scorching avalanche of rocks rushing down Merapi’s western flank—away from Marijan’s village. Thanks to the timely evacuation, nobody is hurt.

Antonius Ratdomopurbo, director of the Volcanological Research and Technological

Development Agency in Yogyakarta, is visibly relieved. “Merapi isn’t a big volcano, but it’s heavily populated. Many people were killed in 1930 simply because they were too close.” Marijan has just been lucky, he says. A month later, the lava dome collapses again, this time to the south, and two rescue workers perish under six feet of hot ash. Again, fortune—or is it the volcano deity?—spares Marijan’s village. Does the Gatekeeper understand anything about the science of volcanoes? “I don’t know,” replies Ratdomopurbo with a tight smile. “You ask him.”

In his stubborn adherence to duty, Marijan has gone head-to-head not only with the authorities but also with his own boss, Hamengku Buwono X, the sultan, who backed the government’s call for an evacuation.

Hamengku Buwono X—the name means “sustainer of the universe”—heads a dynasty that dates back to the 18th century. His official portrait shows him in full Javanese court attire, a curved dagger tucked into his magnificent batik sarong. His everyday wear is an impeccably tailored dark suit—preferably Armani. In his office, during an interview, he puffs on a fat David-

off cigar. A large painting of a volcano hangs on the wall behind him. “Not Merapi,” he says dismissively. “Fuji.”

Though tradition requires he employ Marijan, Hamengku Buwono X, a law graduate, does not believe in volcano-dwelling spirits. He is a progressive Muslim who has urged Yogyakartaans to consider Merapi’s eruptions from a scientific perspective. “A great nation cannot be built on pessimistic myths,” he believes.

The relationship between the sultan and Marijan is uneasy, to say the least. The two inhabit opposite poles: the modern sultan versus the mystical Gatekeeper. Marijan tells reporters he will evacuate if ordered by the sultan—but he doesn’t mean the current ruler. His sultan is the much loved Hamengku Buwono IX, father of Hamengku Buwono X,



Scientists predicted this 2006 eruption of Mount Merapi, but many mystically minded locals refused to leave. "The biggest problem the Indonesians face," said a volcanologist, "is getting the local people to believe what the scientists say."



who appointed Marijan as Gatekeeper and who died almost 20 years ago. "I follow the ninth sultan," he says. "He was the man in the kraton last time I visited."

In Marijan's opinion, the current sultan's biggest mistake is allowing businessmen to strip Merapi of millions of cubic feet of rock and sand. "He is not the sultan," says Marijan witheringly. "He's just the governor."

Marijan is not alone in his disapproval. Some in Yogyakarta accuse Hamengku Buwono X of turning this cultural capital into a city of shopping malls and of spending too much time on the golf course. They yearn for the comfort of ancient rites and criticize the sultan for neglecting ceremonies his father routinely attended. In 2006, the sultan was conspicuously absent from an annual ritual to bless offerings for the ogre Sapu Jagat and the sea goddess Ratu Kidul. The offerings—which include food, flowers, cloth, and clippings of the sultan's hair and fingernails—are meant to ensure the sacred alignment between the volcano, his palace, and the Indian Ocean, and thus the safety of the people.

Less than two weeks after Merapi's first major eruption of 2006, a powerful earthquake had struck south of Yogyakarta, killing more than 5,000 people. The palace and royal burial grounds were also badly damaged—an ill omen for the sultan, already the target of public outrage over the slow distribution of relief funds. Damage control was in order. Even a modern sultan can't escape the force of the old beliefs. With or without him, the annual ritual offerings had to be made.

So the sultan's staff laid out offerings in the quake-damaged courtyard for a brief ceremony, then sent them to waiting cars, which sped off in two separate directions. The first set of offerings was brought to Marijan's house. The next morning, the Gatekeeper hiked to a pavilion a mile from the volcano's peak where, amid trees snapped in half by the latest pyroclastic flow and the crash of tumbling boulders, he solemnly prayed over the sultan's offerings.

A second set of offerings was driven south to Parangkusumo, the Indian Ocean beach where, legend says, the sultan's 16th-century ancestor Senopati met the sea goddess Ratu Kidul. Thousands of houses lay in rubble amid the rice fields. At Parangkusumo, the sultan's staff buried his

hair and fingernail clippings near the beach, in a walled-off compound where two flower-strewn stones marked the site of the ancient encounter. Other offerings were flung into the waves.

It is August. Three months have elapsed since the first major eruption of the year. Though still active, Merapi has settled down. Residents attribute the calm to Marijan's prayers and presence on the volcano. But calm in Indonesia is about as long lasting as a plume of smoke.

THE ANTAGONIST in the equation is militant Islam. Radicalized by events such as 9/11 and the United States invasion of Iraq, groups preaching a more austere version of Islam have gained strength and influence, fueled by the perception that Islam is the cure for Indonesia's ills, notably its poverty and corruption. Some local governments have introduced measures based on sharia, Islamic law, that call for the arrest of women not wearing head scarves or the public whipping of adulterous couples.

Militant Islamists have targeted mysticism

Bearing offerings for Mount Merapi, the faithful follow the Gatekeeper, Mbah Marijan, (second from right) to the top. His mission: To placate the spirit believed to dwell in the mountain. "Merapi," he says, "is the heart of the universe."

in the conviction that such practices pollute the faith. Islamic relief workers who arrived in Yogyakarta following Merapi's first blowup in May 2006 vowed to disrupt rituals held on the volcano, while in Jakarta members of an Islamic youth group hacked branches from a sacred banyan tree to prove it had no magical power.

"People used to believe that things like graves and big trees were sacred," says Muhammad Goodwill Zubir, a leader of Muhammadiyah, an organization focused on peaceful ways to purge the Muslim faith of pre-Islamic influences, including the "heretical" reverence for volcanoes. "As Muhammadiyah spreads in those areas, such beliefs have died out," Zubir says. His movement boasts about 30 million members and runs thousands of mosques, schools, and clinics to promote the orthodoxy. But how to explain a painting of what looks like Merapi hanging outside Zubir's office in Jakarta? "It's just art," he shrugs. Nothing more.

Still, there are men, like Satria Naradha, who



believe that mysticism will not merely survive, it will flourish. Naradha owns Bali's top newspaper and television station. Locals admire the fortysomething media mogul for conducting the lavish rituals that President Yudhoyono so pointedly dislikes.

"Volcanoes are the thrones of the gods," he explains. "They are nature's greatest force, one which can sustain life or destroy it." Naradha is helping underwrite an ambitious program of building Hindu temples across Indonesia, particularly on active volcanoes. In addition to raising nearly one and a half million dollars to complete a temple on Lombok's Mount Rinjani, he has plans to build on Sumbawa's Mount Tambora, site of an 1815 eruption that was the biggest in recorded history. Naturally, he hopes one day to erect a temple on Mount Merapi.

Building Hindu temples in predominantly Muslim areas might seem a dangerous provocation in a country prone to religious and ethnic strife, but Naradha is undeterred. Temples help strengthen Balinese culture by harnessing the spiritual power of the volcanoes they're built on, he explains. Most of all, they help restore the harmony between humans and nature. "This helps all Indonesians, not just the Balinese," he says.

A happy thought, except that harmony seems hard to come by in a nation splintered by multiple beliefs and languages, and the incessant tug-of-war between the modern world and ancient traditions. Revivalist Hinduism, militant Islam, ancient mysticism: Which will prevail? Perhaps all. Perhaps none. Globalization is sweeping through Indonesia like a monsoon. A young Internet-savvy generation worships not volcanoes, but Asian boy bands and English soccer clubs.

But don't count the volcanoes out yet. Recently, Golkar, Indonesia's largest political party, held its annual conference in Yogyakarta. Its ambitious leader, Vice President Jusuf Kalla—he of the inauspicious name—is expected to run for president in 2009.

In the teak-paneled ballroom of the Hyatt Regency, Kalla introduces the guest of honor as a man who is "resolute and able to make decisions in any situation or risk."

It's Mbah Marijan, of course. Who better to launch a campaign for the nation's highest office than the President of Merapi? □

📍 **Volcanoes to Watch** On an interactive map, learn which volcanoes are under study because of their histories and their proximity to humans at ngm.com.

DROWNING IN MUD

AN UNNATURAL
DISASTER ERUPTS
WITH NO END
IN SIGHT



Gas drillers probably triggered an eruption of mud in East Java in May 2006. So far, the mud has engulfed 12 villages and displaced 10,000 families, and is still surging today. Neither engineers nor mystics can stem the flow.



By Andrew Marshall

Photographs by John Stanmeyer

By dawn, the trickle that began

to seep into the neighborhood during the night had become a scalding torrent. Mud surged into the modest house belonging to Sumitro, who manages a store in the Porong District of East Java. As it smothered furniture and filled rooms, Sumitro and Indayani, his wife, grabbed the kids and fled. “I knew the mud couldn’t be stopped,” he says. “My house was doomed.”

Months later, a plume of steam drifting above a landscape of submerged houses marks the source of his woes: a mud volcano—its cause a source of some controversy. Many blame a company drilling for gas; others claim an earthquake was the trigger.

Lusi, as Indonesians call the mudflow, is one of the more bizarre expressions of Indonesia’s geologic turmoil. Since May 2006, it has spewed millions of barrels of heated sludge, blanketing an area twice the size of New York City’s Central Park. Villages have disappeared under the mud, 60 feet deep in places, and 10,000 families have been forced from their homes. So far, according to an IMF estimate, the catastrophe has cost Indonesia 3.7 billion dollars—nearly one percent of its GDP—and triggered spasms of blame and denial. This being Indonesia, it has also prompted appeals to the supernatural.

Lusi—a nickname derived by combining the Indonesian word for mud (*lumpur*) with Sidoarjo, the name of the nearby town—could go on erupting for decades. Meanwhile, trucks and backhoes work relentlessly to contain the damage, fortifying dikes against the 600,000 barrels of mud that continue to surge out each day. Pipes disgorge the sludge into the Porong River; theoretically, rain will wash it to sea—if it doesn’t choke the river and flood nearby Surabaya, a city of 2.5 million.

With the mud came the mystics—Sumatran witch doctors, Balinese Hindu priests, and a celebrity soothsayer, Mama Lauren—claiming they could stop the deluge. Believers tossed goats, geese, and monkeys into the mud to appease

UNDER THE MUD VOLCANO

It began with a burst of steam and a splurt of mud. But the gloopy surge that locals call Lusi soon became a sprawling nightmare. Satellite images (top) show Lusi swallowing more than two square miles in the Porong District. A cross section (right) illustrates what geologist Richard Davies believes caused the disaster.

1. Drillers exploring for gas bored 3,580 feet down, then inserted a steel casing to strengthen the hole.
2. Drilling went deeper without the steel casing. Water and gas filled the hole, and the resulting pressure fractured unprotected rock strata.
3. Hot, high-pressure water was released, probably from the Kujung aquifer.
4. The water raced upward and liquefied masses of mudstone.
5. Mud surged through layers of mudstone and sandstone and broke through the surface.
6. Engineers built dikes in an attempt to contain the mud.
7. Underground, caverns formed and collapsed, causing faults.





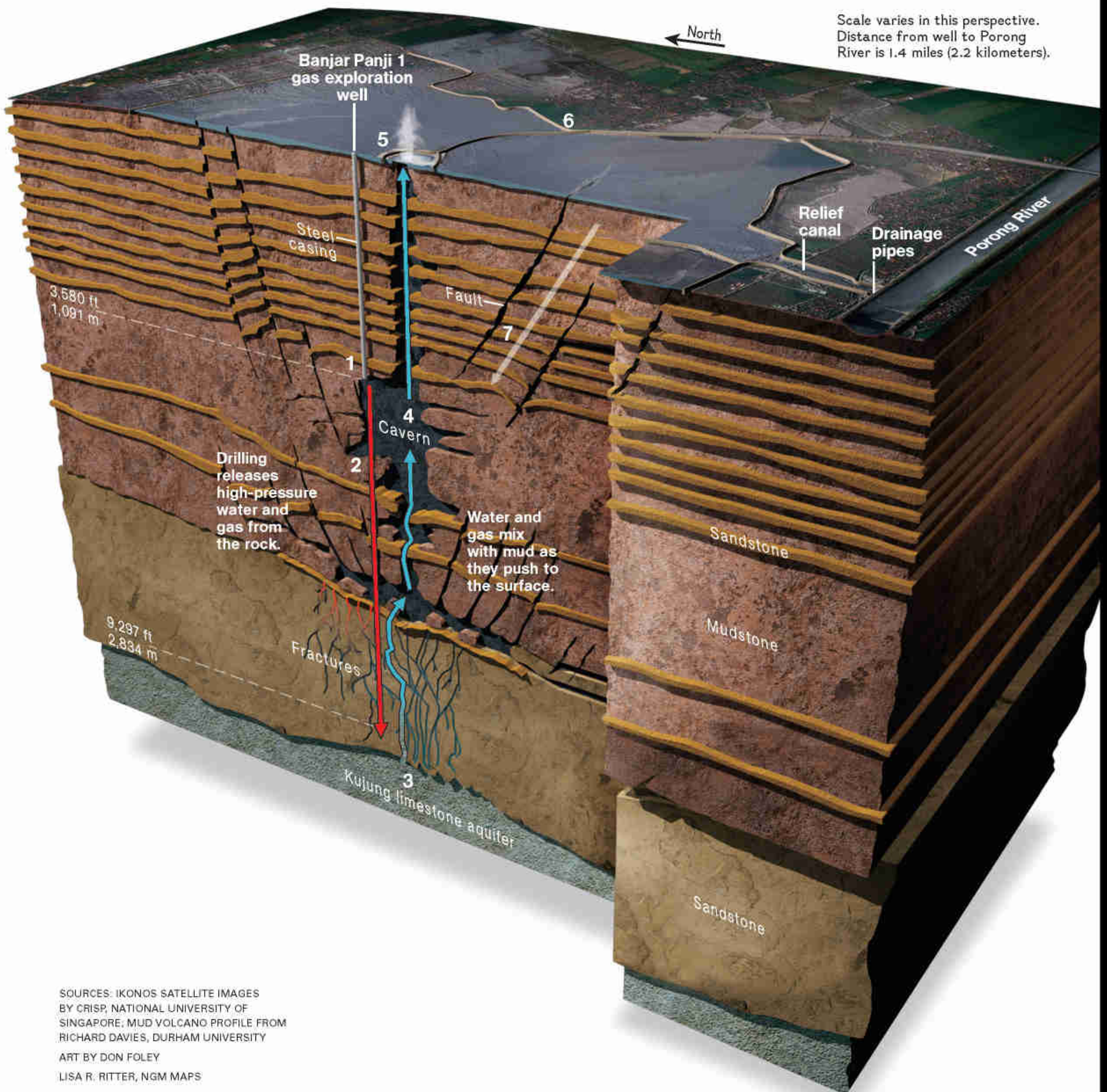
OCTOBER 6, 2005



AUGUST 29, 2006



AUGUST 7, 2007



SOURCES: IKONOS SATELLITE IMAGES BY CRISP, NATIONAL UNIVERSITY OF SINGAPORE; MUD VOLCANO PROFILE FROM RICHARD DAVIES, DURHAM UNIVERSITY
 ART BY DON FOLEY
 LISA R. RITTER, NGM MAPS



the dragon supposedly disturbed by drilling. A wealthy local offered a house to anyone who could halt the mud. First, however, applicants had to prove their powers could stop a tap from dripping. It didn't happen.

Wary of mystics, weary of mud, Sumitro is short on optimism. "Nothing can stop it," he says. "Not technology, not the supernatural."

A dike protected Sumitro's neighborhood until November 2006, when the mud caused

a gas pipeline to explode, killing 13 people. "I thought the end of the world had come," he recalls.

In a way, it had. The explosion weakened the dike, exposing his neighborhood to the flow. Now, footprints of fleeing residents are baked into the mud of empty streets. Scavengers have stripped homes of roof tiles and wiring. The stink of sulfur hangs in the air. "Nothing left now," Sumitro says. "Only memories."



Flanked by red flags to help him hear the earth speak, Kamal, an Islamic teacher, prays to stop the mud, which erupts at the base of the distant steam plume. His vigil lasted three days, but without effect. Some scientists predict mud may keep spewing here for decades.

The politics surrounding the disaster are as muddy as the landscape. PT Lapindo Brantas, the company that operated the ill-fated well, is partly owned by the family of Aburizal Bakrie, Indonesia's chief welfare minister. Bakrie, a billionaire, says the well had nothing to do with the catastrophe; he blames it on a powerful earthquake that struck Yogyakarta, 170 miles away, two days before the mud flood. He has yet to visit Lusi's victims. Just as well.

Anger pervades a market where thousands of displaced villagers encamp. "If Bakrie comes here," one man says, slowly drawing his finger across his throat. Still, Bakrie enjoys the backing of President Susilo Bambang Yudhoyono, who may run again in 2009 and apparently opts not to alienate a fat-cat cabinet member by demanding his resignation.

The Indonesian government ordered Lapindo to pay more than 400 million dollars in compensation. But the money has been slow in coming; Sumitro, chief negotiator for 800 families, believes the company is stalling.

Not so, says a spokesperson for Lapindo. She explains compensation is delayed because claimants cannot provide adequate proof of home or land ownership, and maintains the company has already spent millions to house and feed victims. Claims will be fully paid within two years, she promises, adding that Lapindo has no legal obligation because the disaster's cause remains unproven. "We don't know yet whether this is our fault," she says.

One study by an international team that included a Lapindo employee supported Bakrie's claim that the earthquake caused the mess. But Richard Davies of Durham University in England is dismissive. "One, the earthquake wasn't big enough and was too far away," he says. "Two, we have pretty good evidence for how drilling would have caused this incident."

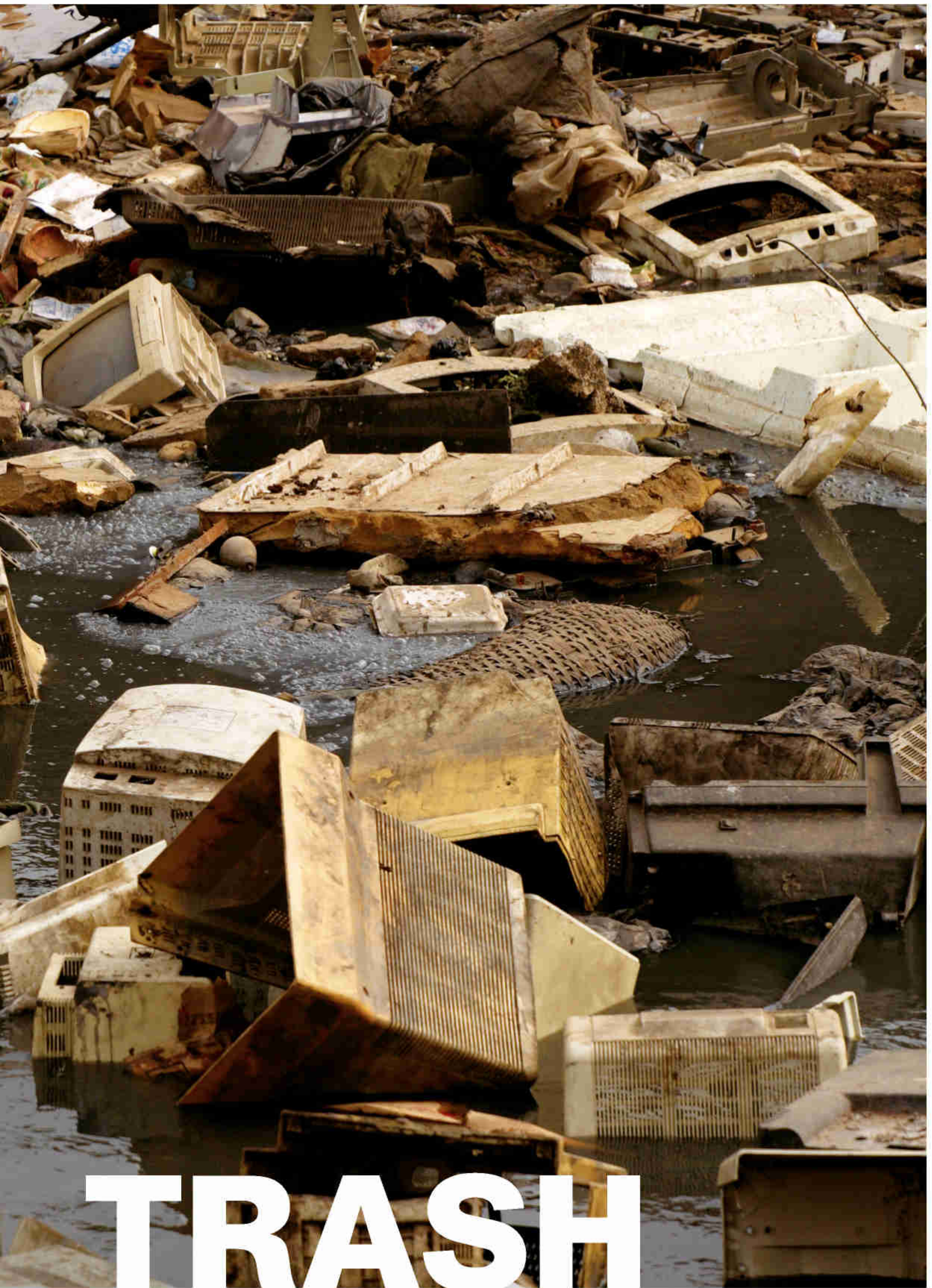
Davies' own studies concluded the eruption was triggered by the drilling and the attempt to control a huge influx of water and gas that fractured sections of the borehole.

An attempt to plug the hole with thousands of concrete balls failed last year. Now Soenarso, chief of the Sidoarjo Mudflow Mitigation Agency, is out of ideas for halting the flow. "I can only say it is in the hands of God Almighty," he told the *Jakarta Post*.

But Lusi isn't finished. Torrential rains could erode dikes, releasing more mud, displacing more people. Whatever happens, one fact remains: for Lusi's victims, Lapindo's name is mud. □



HIGH-TECH



TRASH

Will your discarded TV or computer end up in a ditch in Ghana?



BY CHRIS CARROLL NATIONAL GEOGRAPHIC STAFF
PHOTOGRAPHS BY PETER ESSICK

June is the wet season in Ghana, but here in Accra, the capital, the morning rain has ceased. As the sun heats the humid air, pillars of black smoke begin to rise above the vast Agbogbloshie Market. I follow one plume toward its source, past lettuce and plantain vendors, past stalls of used tires, and through a clanging scrap market where hunched men bash on old alternators and engine blocks. Soon the muddy track is flanked by piles of old TVs, gutted computer cases, and smashed monitors heaped



ten feet high. Beyond lies a field of fine ash speckled with glints of amber and green—the sharp broken bits of circuit boards. I can see now that the smoke issues not from one fire, but from many small blazes. Dozens of indistinct figures move among the acrid haze, some stirring flames with sticks, others carrying armfuls of brightly colored computer wire. Most are children.

Choking, I pull my shirt over my nose and approach a boy of about 15, his thin frame

A boy totes copper wires torn from old electronic devices at a market in Ghana. Power plugs in his bundle point to Europe—where laws forbid shipping such waste to poor nations—as a likely origin.

wreathed in smoke. Karim says he has been tending such fires for two years. He pokes at one meditatively, and then his top half disappears as he bends into the billowing soot. He hoists a tangle of copper wire off the old tire he's using for fuel and douses the hissing mass in a puddle. With the flame retardant insulation burned away—a process that has released a bouquet of carcinogens and other toxics—the wire may fetch a dollar from a scrap-metal buyer.

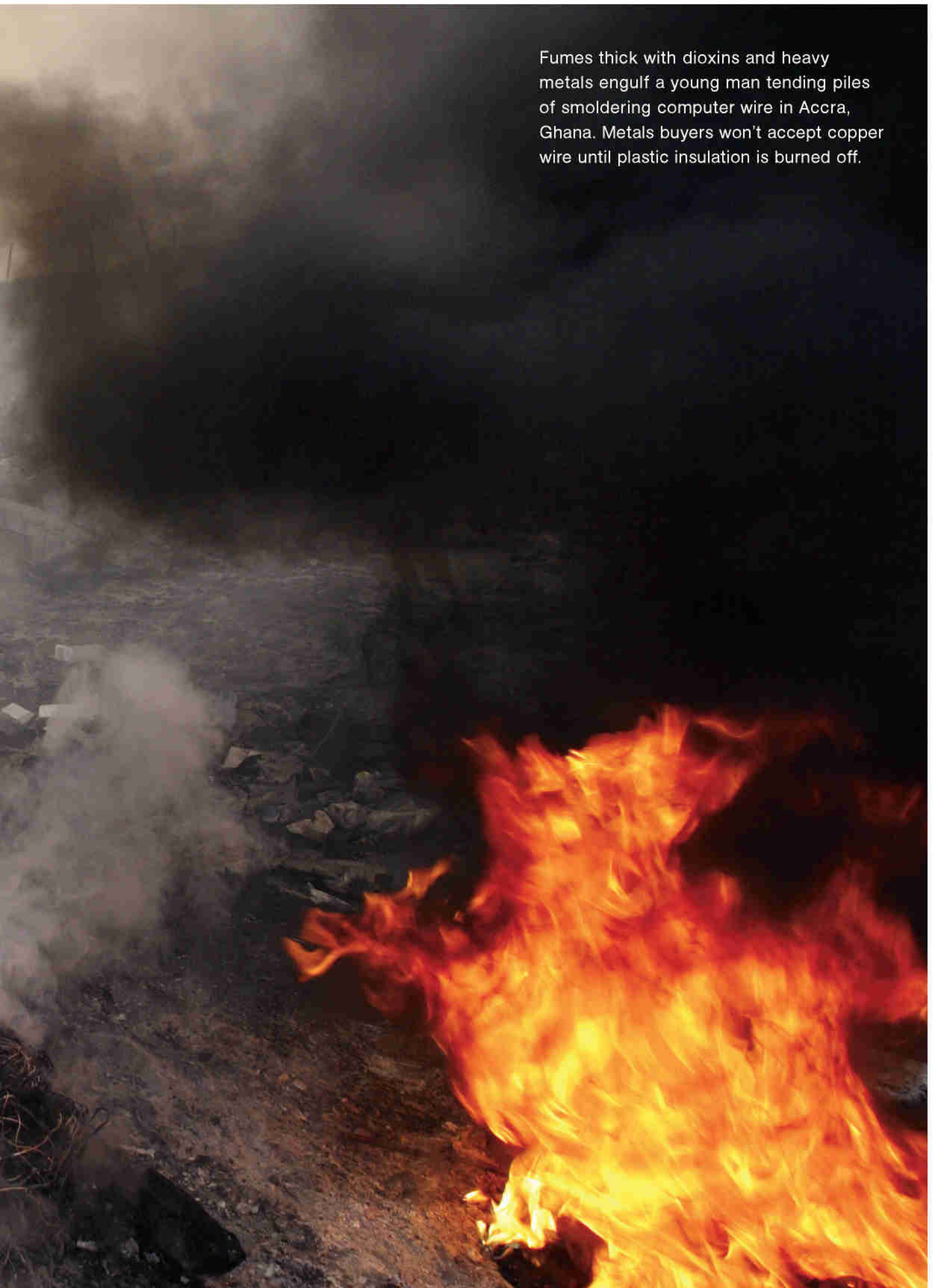
Another day in the market, on a similar ash heap above an inlet that flushes to the Atlantic after a downpour, Israel Mensah, an incongruously stylish young man of about 20, adjusts his designer glasses and explains how he makes his living. Each day scrap sellers bring loads of old electronics—from where he doesn't know. Mensah and his partners—friends and family, including two shoeless boys raptly listening to us talk—buy a few computers or TVs. They break copper yokes off picture tubes, littering the ground with shards containing lead, a neurotoxin, and cadmium, a carcinogen that damages lungs and kidneys. They strip resalable parts such as drives and memory chips. Then they rip out wiring and burn the plastic. He sells copper stripped from one scrap load to buy another. The key to making money is speed, not safety. “The gas goes to your nose and you feel something in your head,” Mensah says, knocking his fist against the back of his skull for effect. “Then you get sick in your head and your chest.” Nearby, hulls of broken monitors float in the lagoon. Tomorrow the rain will wash them into the ocean.

PEOPLE HAVE ALWAYS BEEN proficient at making trash. Future archaeologists will note that at the tail end of the 20th century, a new, noxious kind of clutter exploded across the landscape: the digital detritus that has come to be called e-waste.

More than 40 years ago, Gordon Moore, co-founder of the computer-chip maker Intel,



Fumes thick with dioxins and heavy metals engulf a young man tending piles of smoldering computer wire in Accra, Ghana. Metals buyers won't accept copper wire until plastic insulation is burned off.





REUSE Workers strip picture tubes from thousands of used computer monitors piled at Monitex, a Grand Prairie, Texas, recycler. Tubes that work will be exported to a factory in Thailand, where they'll be used in low-cost TVs. Broken ones are recycled domestically.

observed that computer processing power roughly doubles every two years. An unstated corollary to “Moore’s law” is that at any given time, all the machines considered state-of-the-art are simultaneously on the verge of obsolescence. At this very moment, heavily

Photographer Peter Essick has contributed more than 30 stories to National Geographic. His last feature, on swarm behavior, appeared in July of last year.

caffeinated software engineers are designing programs that will overtax and befuddle your new turbo-powered PC when you try running them a few years from now. The memory and graphics requirements of Microsoft’s recent Vista operating system, for instance, spell doom for aging machines that were still able to squeak by a year ago. According to the U.S. Environmental Protection Agency, an estimated 30 to 40 million PCs will be ready for “end-of-life



management” in each of the next few years.

Computers are hardly the only electronic hardware hounded by obsolescence. A switchover to digital high-definition television broadcasts is scheduled to be complete by 2009, rendering inoperable TVs that function perfectly today but receive only an analog signal. As viewers prepare for the switch, about 25 million TVs are taken out of service yearly. In the fashion-conscious mobile market, 98 million U.S. cell phones took their last

call in 2005. All told, the EPA estimates that in the U.S. that year, between 1.5 and 1.9 million tons of computers, TVs, VCRs, monitors, cell phones, and other equipment were discarded. If all sources of electronic waste are tallied, it could total 50 million tons a year worldwide, according to the UN Environment Programme.

So what happens to all this junk?

In the United States, it is estimated that more than 70 percent of discarded computers and monitors, and well over 80 percent of TVs, eventually end up in landfills, despite a growing number of state laws that prohibit dumping of e-waste, which may leak lead, mercury, arsenic, cadmium, beryllium, and other toxics into the ground. Meanwhile, a staggering volume of unused electronic gear sits in storage—about 180 million TVs, desktop PCs, and other components as of 2005, according to the EPA. Even if this obsolete equipment remains in attics and basements indefinitely, never reaching a landfill, this solution has its own, indirect impact on the environment. In addition to toxics, e-waste contains goodly amounts of silver, gold, and other valuable metals that are highly efficient conductors of electricity. In theory, recycling gold from old computer motherboards is far more efficient and less environmentally destructive than ripping it from the earth, often by surface-mining that imperils pristine rain forests.

Currently, less than 20 percent of e-waste entering the solid waste stream is channeled through companies that advertise themselves as recyclers, though the number is likely to rise as states like California crack down on landfill dumping. Yet recycling, under the current system, is less benign than it sounds. Dropping your old electronic gear off with a recycling company or at a municipal collection point does not guarantee that it will be safely disposed of. While some recyclers process the material with an eye toward minimizing pollution and health risks, many more sell it to brokers who ship it to the developing world, where environmental enforcement is weak. For people in countries on the front end of this arrangement, it’s a handy out-of-sight, out-of-mind solution.

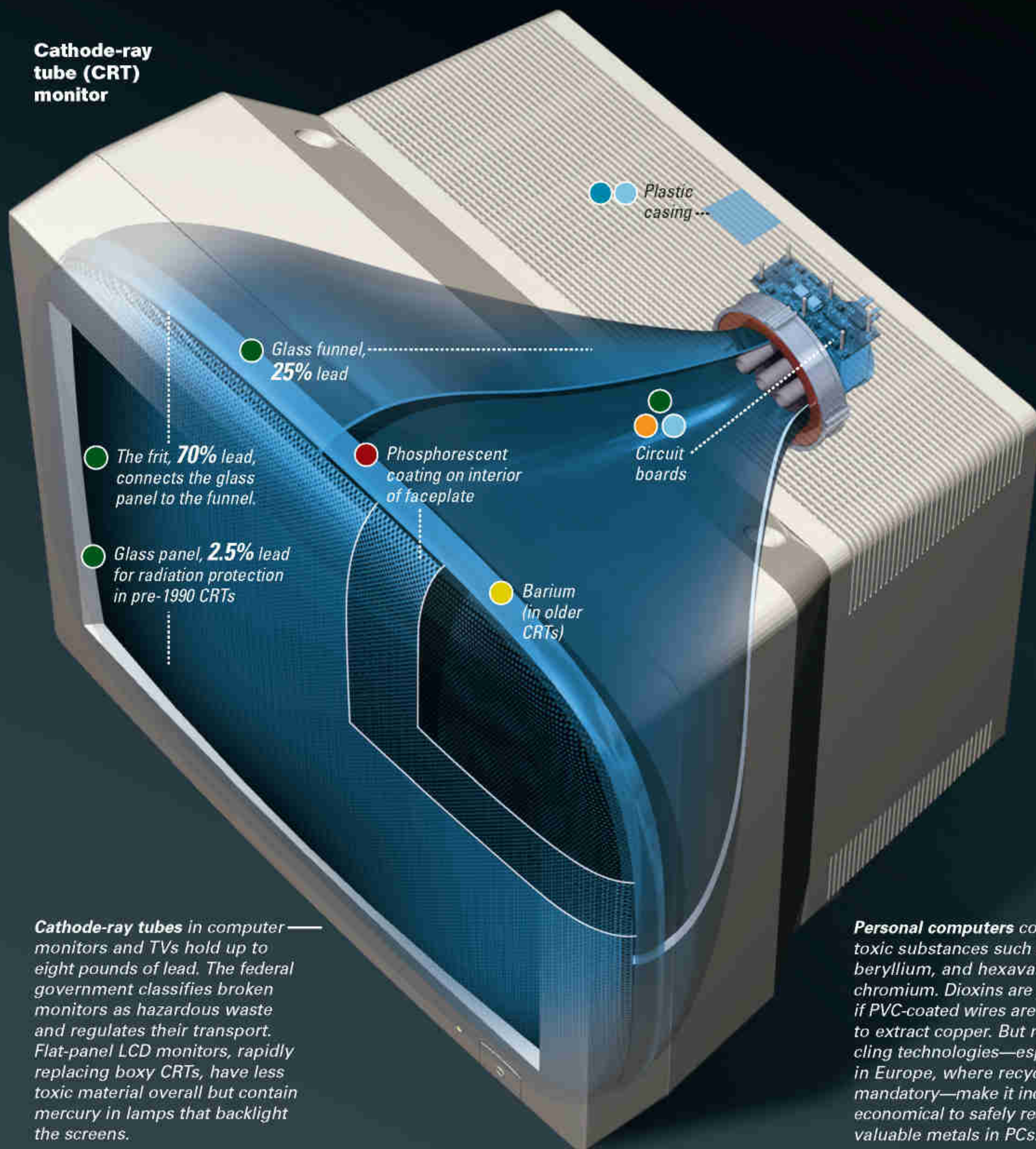
Many governments, conscious that electronic waste wrongly handled damages the environment and human health, have tried to weave an

E-HAZARDS

Personal computers and other electronics contain parts that pose no danger in daily use but become toxic without proper disposal. The U.S. alone yearly casts off tens of millions of PCs and televisions and nearly 100 million cell phones, largely without precaution for their potentially hazardous components. Of the small portion of e-waste sent to domestic recyclers, most is shipped to environmentally unsound salvage operations in the developing world.

TOXIC COMPONENTS IN PERSONAL COMPUTERS

Cathode-ray tube (CRT) monitor

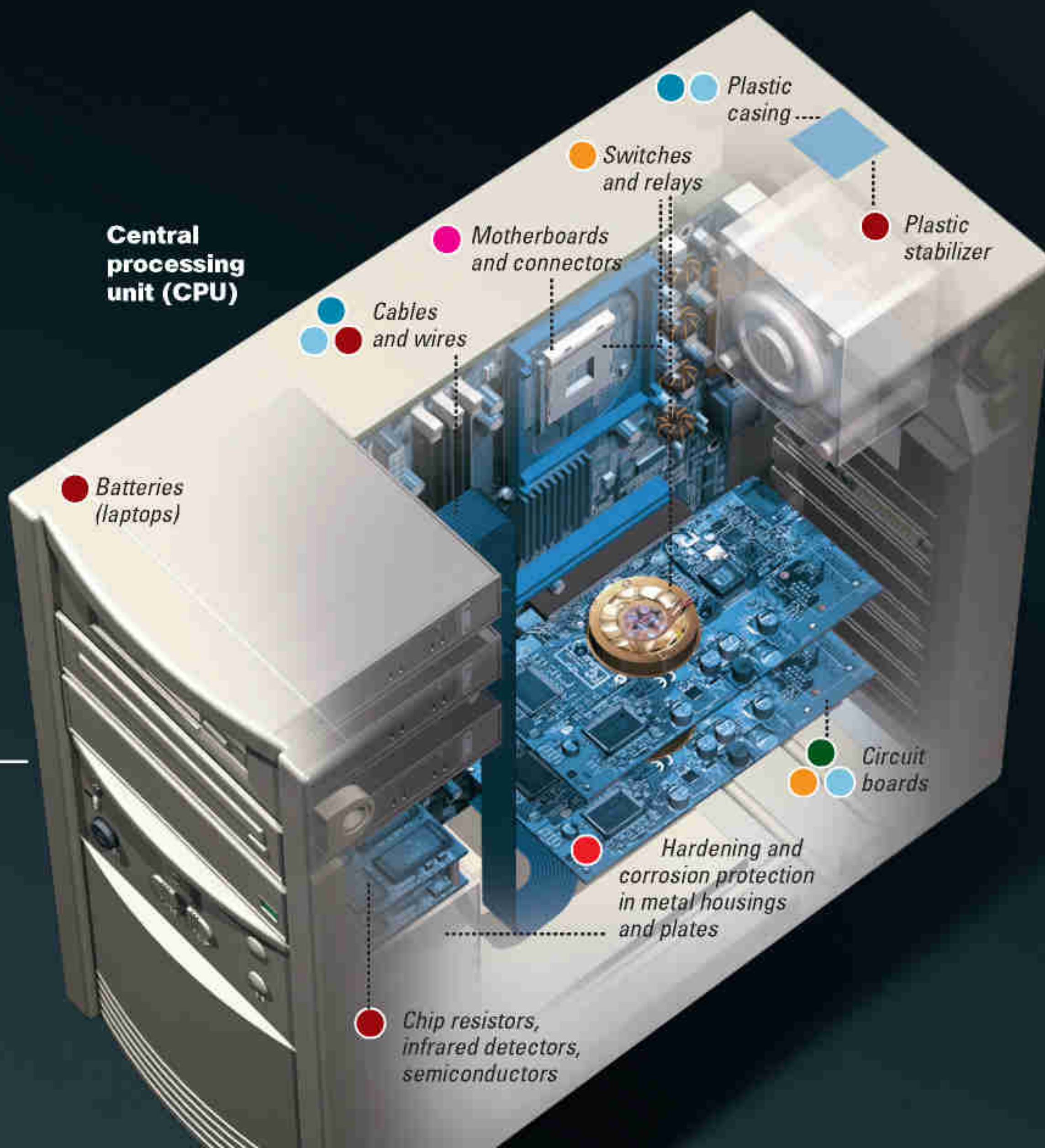


Cathode-ray tubes in computer monitors and TVs hold up to eight pounds of lead. The federal government classifies broken monitors as hazardous waste and regulates their transport. Flat-panel LCD monitors, rapidly replacing boxy CRTs, have less toxic material overall but contain mercury in lamps that backlight the screens.

Personal computers contain toxic substances such as lead, beryllium, and hexavalent chromium. Dioxins are released if PVC-coated wires are burned to extract copper. But new recycling technologies—especially in Europe, where recycling is mandatory—make it increasingly economical to safely recycle the valuable metals in PCs.

THE FATE OF HIGH-TECH TRASH

When U.S. consumers upgrade their electronics, nearly half the old models aren't trashed: They're stored or given away. Of discarded electronics (graph), a growing percentage are recycled, but most go to landfills, with a tiny fraction incinerated.

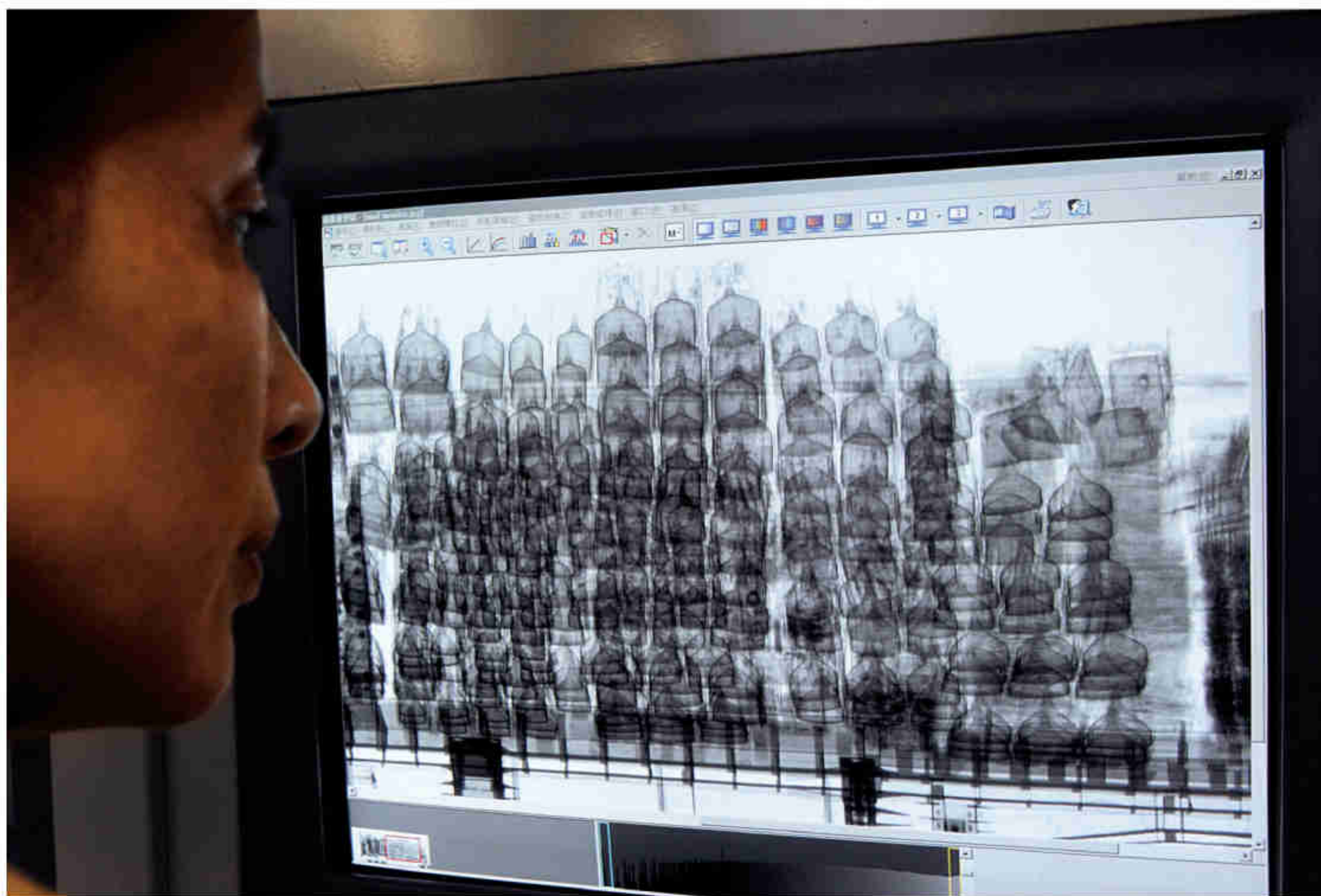


HEALTH RISKS

The elements and compounds in e-waste can leach into soil and water or scatter as particles in the air if electronics are buried in landfills, incinerated, or improperly dismantled.

- **LEAD** A neurotoxin, it also harms the kidneys and reproductive system. Even low-level lead exposure can impair a child's mental development.
- **PVC** Incinerating this versatile plastic produces highly toxic dioxins.
- **BROMINATED FLAME RETARDANTS** This group of compounds may cause thyroid damage and harm fetal development.
- **BARIUM** Elevated exposure causes gastrointestinal disturbance, muscle weakness, breathing difficulty, and a rise or fall in blood pressure.
- **CHROMIUM** Inhaling the hexavalent form of chromium can damage liver and kidneys, increase risk of lung cancer, and cause asthmatic bronchitis.
- **MERCURY** Linked to brain and kidney damage; harmful to a developing fetus. It can be passed through breast milk.
- **BERYLLIUM** A carcinogen, beryllium dust causes lung disease.
- **CADMIUM** Long-term exposure to this carcinogen damages kidneys and bones.

SOURCES: U.S. ENVIRONMENTAL PROTECTION AGENCY (GRAPH); STEPHEN MUSSON, UNIVERSITY OF FLORIDA; TOXNET, U.S. NATIONAL LIBRARY OF MEDICINE
ART BY DON FOLEY; DESIGN BY JUAN VELASCO, NGM ART



international regulatory net. The 1989 Basel Convention, a 170-nation accord, requires that developed nations notify developing nations of incoming hazardous waste shipments. Environmental groups and many undeveloped nations called the terms too weak, and in 1995 protests led to an amendment known as the Basel Ban, which forbids hazardous waste shipments to poor countries. Though the ban has yet to take effect, the European Union has written the requirements into its laws.

The EU also requires manufacturers to shoulder the burden of safe disposal. Recently a new EU directive encourages “green design” of electronics, setting limits for allowable levels of lead, mercury, fire retardants, and other substances. Another directive requires manufacturers to set up infrastructure to collect e-waste and ensure responsible recycling—a strategy called take-back. In spite of these safeguards, untold tons of e-waste still slip out of European ports, on their way to the developing world.

In the United States, electronic waste has been less of a legislative priority. One of only three countries to sign but not ratify the Basel Convention (the other two are Haiti and Afghanistan),

it does not require green design or take-back programs of manufacturers, though a few states have stepped in with their own laws. The U.S. approach, says Matthew Hale, EPA solid waste program director, is instead to encourage responsible recycling by working with industry—for instance, with a ratings system that rewards environmentally sound products with a seal of approval. “We’re definitely trying to channel market forces, and look for cooperative approaches and consensus standards,” Hale says.

The result of the federal hands-off policy is that the greater part of e-waste sent to domestic recyclers is shunted overseas.

“We in the developed world get the benefit from these devices,” says Jim Puckett, head of Basel Action Network, or BAN, a group that opposes hazardous waste shipments to developing nations. “But when our equipment becomes unusable, we externalize the real environmental costs and liabilities to the developing world.”

ASIA IS THE CENTER of much of the world’s high-tech manufacturing, and it is here the devices often return when they die. China in particular has long been the world’s electronics graveyard.



GLOBAL TRAFFIC A Hong Kong customs agent (above left) eyes an x-ray of an illegal shipment of monitors, which contain large amounts of toxic lead. China forbids the import of electronic and computer scrap, but waste experts say the clampdown has driven e-waste elsewhere. In Malaysia (above), used but functional monitors from Western countries are refurbished for resale.

With explosive growth in its manufacturing sector fueling demand, China's ports have become conduits for recyclable scrap of every sort: steel, aluminum, plastic, even paper. By the mid-1980s, electronic waste began freely pouring into China as well, carrying the lucrative promise of the precious metals embedded in circuit boards.

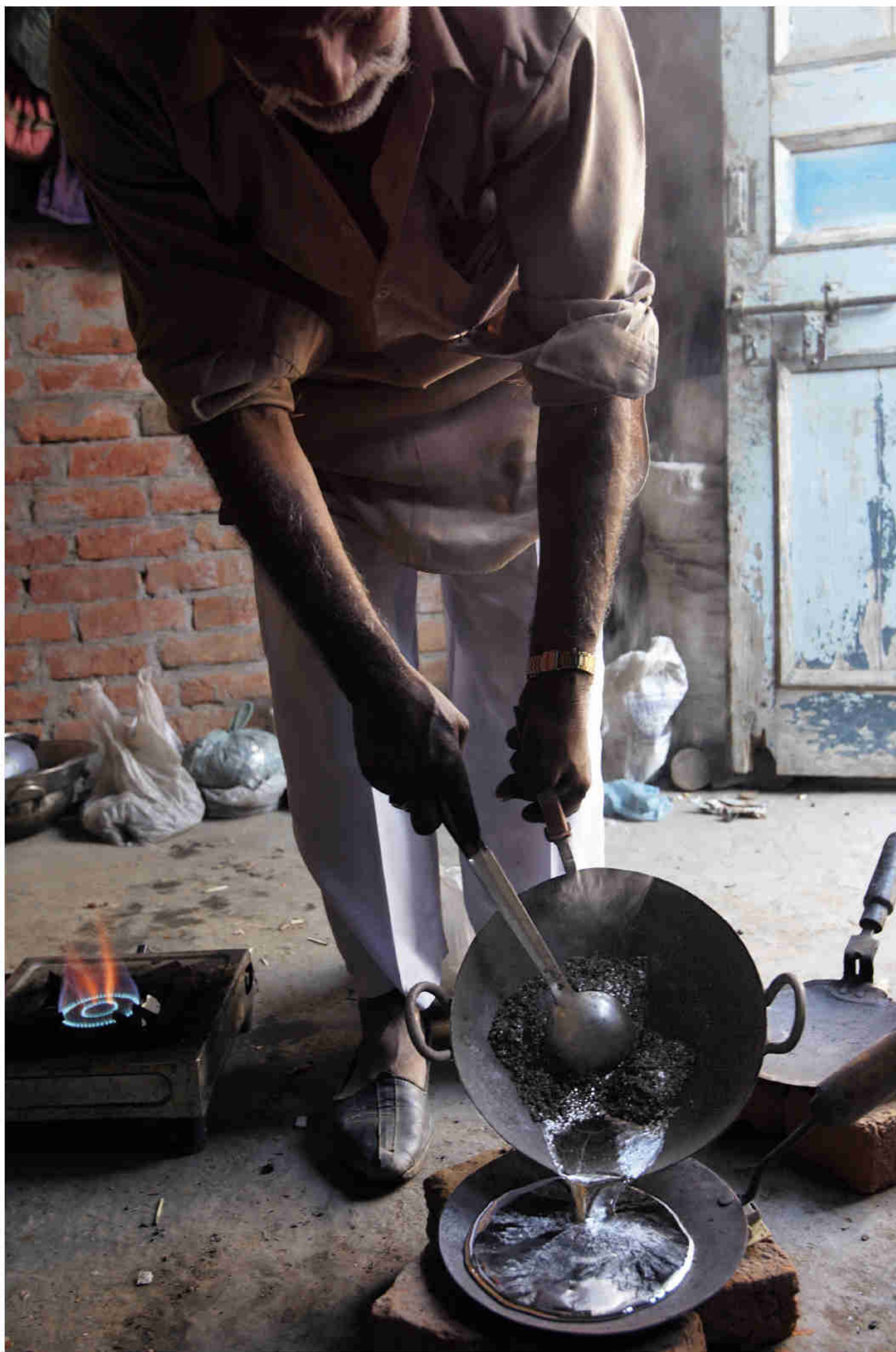
Vandell Norwood, owner of Corona Visions, a recycling company in San Antonio, Texas, remembers when foreign scrap brokers began trolling for electronics to ship to China. Today he opposes the practice, but then it struck him and many other recyclers as a win-win situation. "They said this stuff was all going to get recycled and put back into use," Norwood remembers brokers assuring him. "It seemed environmentally responsible. And it was profitable, because I was getting paid to have it taken off my hands." Huge volumes of scrap electronics were shipped out, and the profits rolled in.

Any illusion of responsibility was shattered in

2002, the year Puckett's group, BAN, released a documentary film that showed the reality of e-waste recycling in China. *Exporting Harm* focused on the town of Guiyu in Guangdong Province, adjacent to Hong Kong. Guiyu had become the dumping ground for massive quantities of electronic junk. BAN documented thousands of people—entire families, from young to old—engaged in dangerous practices like burning computer wire to expose copper, melting circuit boards in pots to extract lead and other metals, or dousing the boards in powerful acid to remove gold.

China had specifically prohibited the import of electronic waste in 2000, but that had not stopped the trade. After the worldwide publicity BAN's film generated, however, the government lengthened the list of forbidden e-wastes and began pushing local governments to enforce the ban in earnest.

On a recent trip to Taizhou, a city in Zhejiang Province south of Shanghai that was another



TOXIC MELT In a poor suburb of New Delhi, India, where informal e-waste processing is a common household business, a man pours molten lead smelted from circuit boards. His family uses the same pots for cooking—a potentially deadly practice.



DUMPED A farmer in rural Taizhou, China, readies sweet potatoes for market beside circuit boards burned so metals could be extracted. The region has long been a major dump site for e-waste, but a crackdown by authorities has reduced illegal trade.

IN CHINA the air near some electronics salvage operations contains the highest amounts of dioxin measured anywhere in the world. Soils are saturated with the chemical.

center of e-waste processing, I saw evidence of both the crackdown and its limits. Until a few years ago, the hill country outside Taizhou was the center of a huge but informal electronics disassembly industry that rivaled Guiyu's. But these days, customs officials at the nearby Haimen and Ningbo ports—clearinghouses for massive volumes of metal scrap—are sniffing around incoming shipments for illegal hazardous waste.

High-tech scrap "imports here started in the 1990s and reached a peak in 2003," says a high school teacher whose students tested the environment around Taizhou for toxics from e-waste. He requested anonymity from fear of local recyclers angry about the drop in business. "It has been falling since 2005 and now is hard to find."

Today the salvagers operate in the shadows. Inside the open door of a house in a hillside village, a homeowner uses pliers to rip microchips and metal parts off a computer motherboard. A buyer will burn these pieces to recover copper. The man won't reveal his name. "This business is illegal," he admits, offering a cigarette. In the same village, several men huddle inside a shed, heating circuit boards over a flame to extract metal. Outside the door lies a pile of scorched boards. In another village a few miles away, a woman stacks up bags of circuit boards in her house. She shoos my translator and me away. Continuing through the hills, I see people tearing apart car batteries, alternators, and high-voltage cable for recycling, and others hauling aluminum scrap to an aging smelter. But I find no one else working with electronics. In Taizhou, at least, the e-waste business seems to be waning.

Yet for some people it is likely too late; a cycle of disease or disability is already in motion. In a spate of studies released last year, Chinese scientists documented the environmental plight of Guiyu, the site of the original BAN film. The air near some electronics salvage operations that

remain open contains the highest amounts of dioxin measured anywhere in the world. Soils are saturated with the chemical, a probable carcinogen that may disrupt endocrine and immune function. High levels of flame retardants called PBDEs—common in electronics, and potentially damaging to fetal development even at very low levels—turned up in the blood of the electronics workers. The high school teacher in Taizhou says his students found high levels of PBDEs in plants and animals. Humans were also tested, but he was not at liberty to discuss the results.

China may someday succeed in curtailing electronic waste imports. But e-waste flows like water. Shipments that a few years ago might have gone to ports in Guangdong or Zhejiang Provinces can easily be diverted to friendlier environs in Thailand, Pakistan, or elsewhere. "It doesn't help in a global sense for one place like China, or India, to become restrictive," says David N. Pellow, an ethnic studies professor at the University of California, San Diego, who studies electronic waste from a social justice perspective. "The flow simply shifts as it takes the path of least resistance to the bottom."

IT IS NEXT TO IMPOSSIBLE to gauge how much e-waste is still being smuggled into China, diverted to other parts of Asia, or—increasingly—dumped in West African countries like Ghana, Nigeria, and Ivory Coast. At ground level, however, one can pick out single threads from this global toxic tapestry and follow them back to their source.

In Accra, Mike Anane, a local environmental journalist, takes me down to the seaport. Guards block us at the gate. But some truck drivers at a nearby gas station point us toward a shipment facility just up the street, where they say computers are often unloaded. There, in a storage yard, locals are opening a shipping container from Germany. Shoes, clothes, and handbags pour out onto the tarmac. Among the clutter: some battered Pentium 2 and 3 computers and monitors with cracked cases and missing knobs, all sitting in the rain. A man hears us asking questions. "You want computers?" he asks. "How many containers?"

Near the port I enter a garage-like building



RECYCLE On the disassembly line at the Mueller-Guttenbrunn Group recycling facility in Amstetten, Austria, workers sort smashed electronics—circuit boards being the most valuable. European regulations require electronics manufacturers to cover recycling costs when their products are discarded.

with a sign over the door: “Importers of British Used Goods.” Inside: more age-encrusted PCs, TVs, and audio components. According to the manager, the owner of the facility imports a 40-foot container every week. Working items go up for sale. Broken ones are sold for a pittance to scrap collectors.

All around the city, the sidewalks are choked with used electronics shops. In a suburb called Darkuman, a dim stall is stacked front to back with CRT monitors. These are valueless relics in wealthy countries, particularly hard to dispose of because of their high levels of lead and other toxics. Apparently no one wants them here, either. Some are monochrome, with tiny screens. Boys will soon be smashing them up in a scrap market.

A price tag on one of the monitors bears the label of a chain of Goodwill stores headquartered in Frederick, Maryland, a 45-minute drive from my house. A lot of people donate their old computers to charity organizations, believing they’re doing the right thing. I might well have done the

same. I ask the proprietor of the shop where he got the monitors. He tells me his brother in Alexandria, Virginia, sent them. He sees no reason not to give me his brother’s phone number.

When his brother Baah finally returns my calls, he turns out not to be some shady character trying to avoid the press, but a maintenance man in an apartment complex, working 15-hour days fixing toilets and lights. To make ends meet, he tells me, he works nights and weekends exporting used computers to Ghana through his brother. A Pentium 3 brings \$150 in Accra, and he can sometimes buy the machines for less than \$10 on Internet liquidation websites—he favors private ones, but the U.S. General Services Administration runs one as well. Or he buys bulk loads from charity stores. (Managers of the Goodwill store whose monitor ended up in Ghana denied selling large quantities of computers to dealers.) Whatever the source, the profit margin on a working computer is substantial.

The catch: Nothing is guaranteed to work,

IN THE LONG RUN, the only way to prevent e-waste from flooding Accra, Taizhou, or a hundred other places is to carve a new, more responsible direction for it to flow in.

and companies always try to unload junk. CRT monitors, though useless, are often part of the deal. Baah has neither time nor space to unpack and test his monthly loads. “You take it over there and half of them don’t work,” he says disgustedly. All you can do then is sell it to scrap people, he says. “What they do with it from that point, I don’t know nothing about it.”

BAAH’S LITTLE EXPORTING BUSINESS is just one trickle in the cataract of e-waste flowing out of the U.S. and the rest of the developed world. In the long run, the only way to prevent it from flooding Accra, Taizhou, or a hundred other places is to carve a new, more responsible direction for it to flow in. A Tampa, Florida, company called Creative Recycling Systems has already begun.

The key to the company’s business model rumbles away at one end of a warehouse—a building-size machine operating not unlike an assembly line in reverse. “David” was what company president Jon Yob called the more than three-million-dollar investment in machines and processes when they were installed in 2006; Goliath is the towering stockpile of U.S. e-scrap. Today the machine’s steel teeth are chomping up audio and video components. Vacuum pressure and filters capture dust from the process. “The air that comes out is cleaner than the ambient air in the building,” vice president Joe Yob (Jon’s brother) bellows over the roar. A conveyor belt transports material from the shredder through a series of sorting stations: vibrating screens of varying finenesses, magnets, a device to extract leaded glass, and an eddy current separator—akin to a reverse magnet, Yob says—that propels nonferrous metals like copper and aluminum into a bin, along with precious metals like gold, silver, and palladium. The most valuable product, shredded circuit boards, is shipped to a state-of-the-art smelter

in Belgium specializing in precious-metals recycling. According to Yob, a four-foot-square box of the stuff can be worth as much as \$10,000.

In Europe, where the recycling infrastructure is more developed, plant-size recycling machines like David are fairly common. So far, only three other American companies have such equipment. David can handle some 150 million pounds of electronics a year; it wouldn’t take many more machines like it to process the entire country’s output of high-tech trash. But under current policies, pound for pound it is still more profitable to ship waste abroad than to process it safely at home. “We can’t compete economically with people who do it wrong, who ship it overseas,” Joe Yob says. Creative Recycling’s investment in David thus represents a gamble—one that could pay off if the EPA institutes a certification process for recyclers that would define minimum standards for the industry. Companies that rely mainly on export would have difficulty meeting such standards. The EPA is exploring certification options.

Ultimately, shipping e-waste overseas may be no bargain even for the developed world. In 2006 Jeffrey Weidenhamer, a chemist at Ashland University in Ohio, bought some cheap, Chinese-made jewelry at a local dollar store for his class to analyze. That the jewelry contained high amounts of lead was distressing, but hardly a surprise; Chinese-made leaded jewelry is all too commonly marketed in the U.S. More revealing were the amounts of copper and tin alloyed with the lead. As Weidenhamer and his colleague Michael Clement argued in a scientific paper published this past July, the proportions of these metals in some samples suggest their source was leaded solder used in the manufacture of electronic circuit boards.

“The U.S. right now is shipping large quantities of leaded materials to China, and China is the world’s major manufacturing center,” Weidenhamer says. “It’s not all that surprising things are coming full circle and now we’re getting contaminated products back.” In a global economy, out of sight will not stay out of mind for long. □

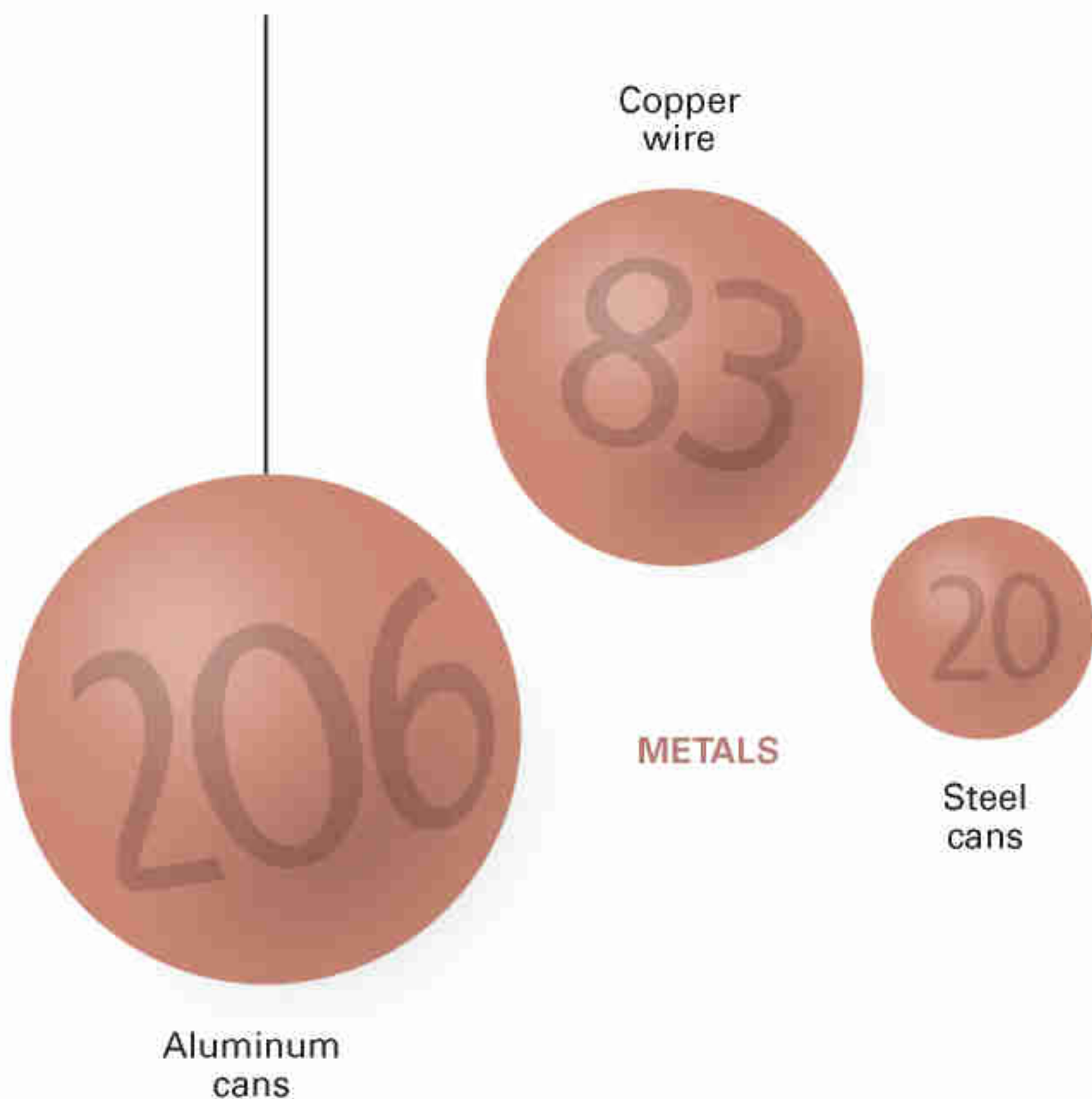
▲ **Injurious Innards** Lying in a landfill, a desktop computer can take a toll on public health. Take a tour of its toxic components at ngm.com.



CHILD LABOR In Karachi, Pakistan, Salman Aziz, 11, harvests bits of metal from computer mice. As the volume of electronic waste continues to grow worldwide, so does the need for humane and environmentally sound ways to recycle the wealth of raw materials inside it.

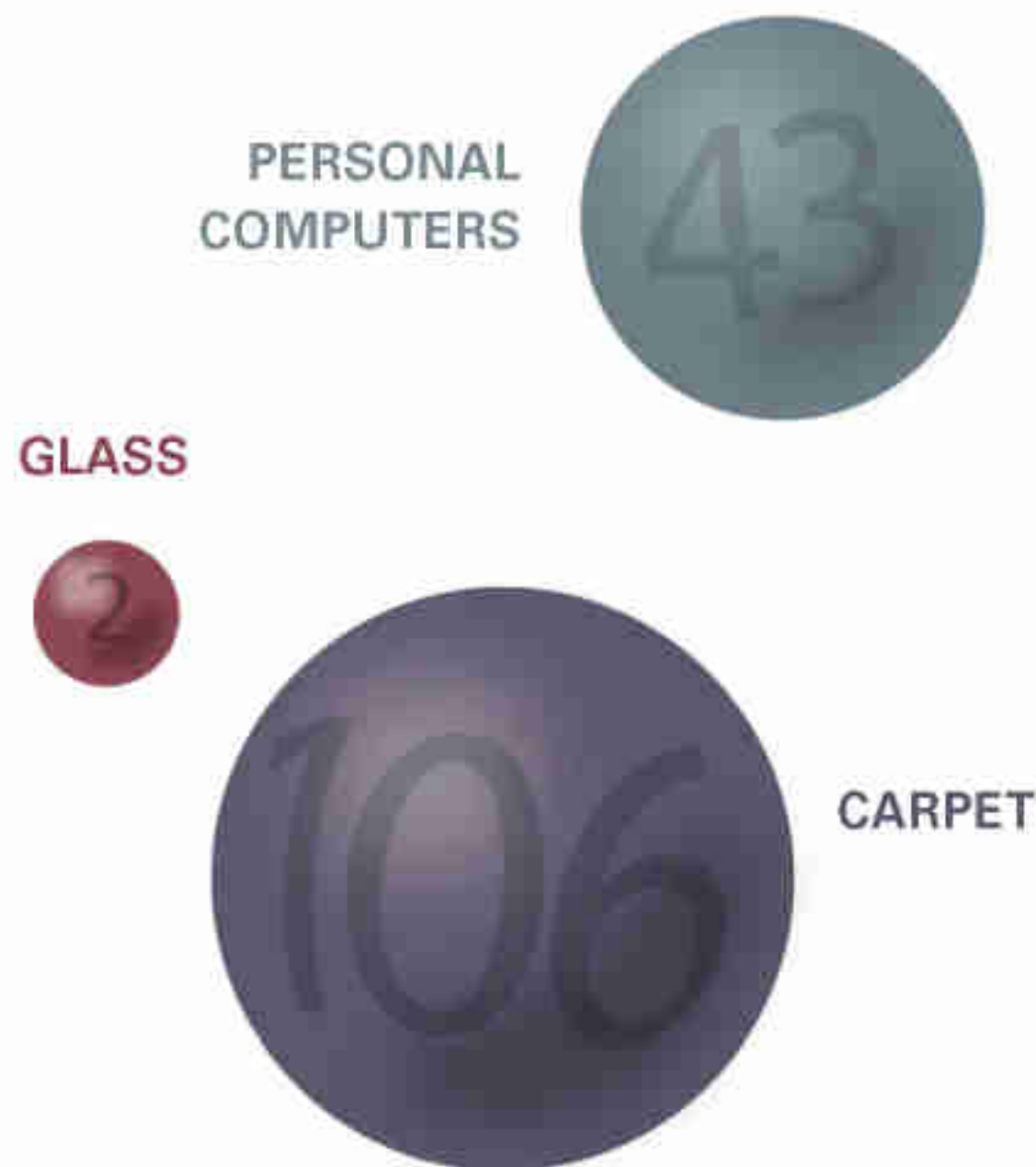
U.S. ENERGY SAVINGS

Each sphere represents the energy saved in the U.S., in millions of Btu* per ton, when products are manufactured using the maximum percentage of recycled material, compared with using virgin materials alone.



COMPARING ENERGY SAVINGS

Industries can save large amounts of energy by using scrap rather than harvesting and processing virgin raw materials. Savings also come in the manufacturing process. When waste glass is used to make bottles, furnaces can be set at lower temperatures. How much are the savings? For aluminum, recycling can cut energy consumption by 95 percent; plastics, by 70 percent; steel, 60 percent; paper, 40 percent; and glass, 30 percent.



* One million Btu equals nearly the same energy as in eight gallons of gasoline.

SOURCES: SOLID WASTE MANAGEMENT AND GREENHOUSE GASES: A LIFE-CYCLE ASSESSMENT OF EMISSIONS AND SINKS, EPA, SEPTEMBER 2006; ICF CONSULTING; OWENS-ILLINOIS, CONSULTANT; STEPHEN MUSSON, UNIVERSITY OF FLORIDA.

ART BY TOM ZELLER, JR., NGM ART

RECYCLING

THE BIG PICTURE

BY TOM ZELLER, JR. NATIONAL GEOGRAPHIC STAFF

DOES IT MAKE SENSE TO RECYCLE?

The short answer is: Yes.

True, some critics wonder whether mandatory programs are a net benefit, since they can require more trucks consuming energy and belching carbon dioxide into the atmosphere.

“You don’t want a large truck carrying around just a few bottles,” concedes Matthew Hale, director of EPA’s Office of Solid Waste. But, he notes, most cities are getting better at reducing the environmental costs of recycling. (They’re also working to reduce the economic costs. Many recycling programs still cost more to run than they bring in when they sell the recyclable materials back to manufacturers.)

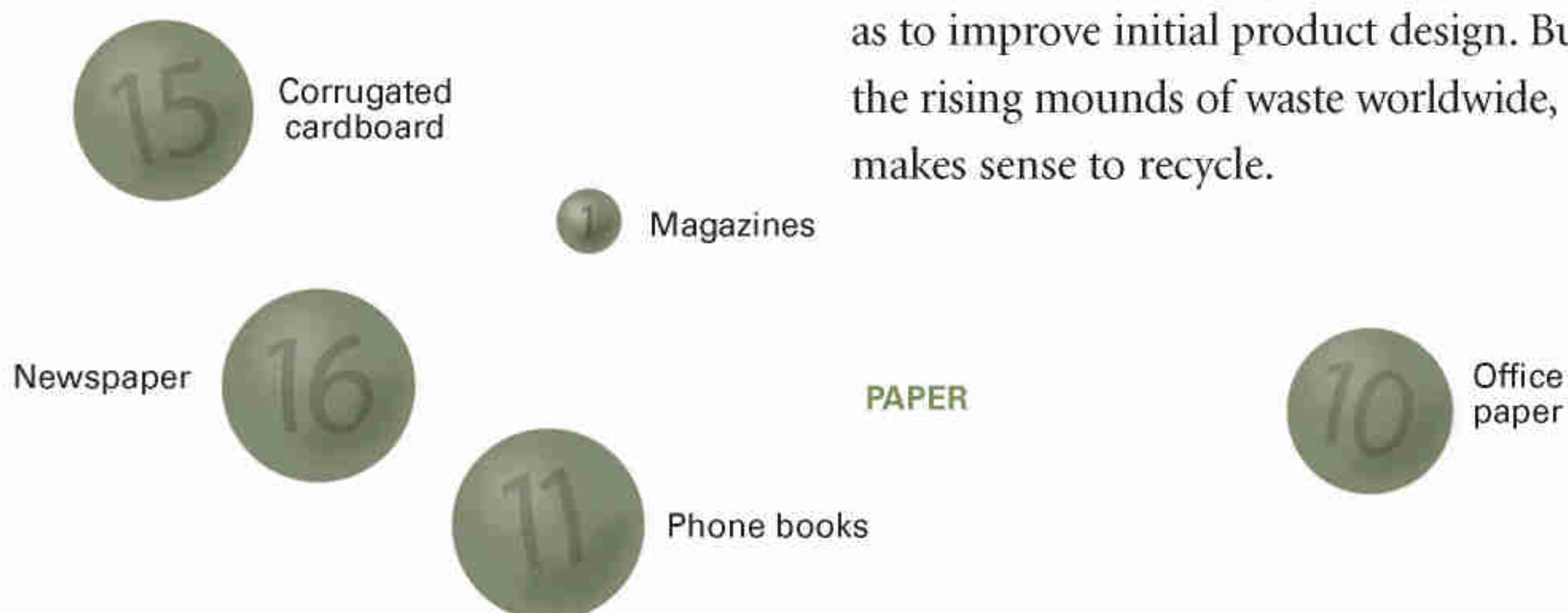
Consider the true cost of a product over its entire life—from harvesting the raw materials to creating, consuming, and disposing of it—and the scale tips dramatically in recycling’s favor. Every shrink-wrapped toy or tool or medical device we buy bears the stamp of its

energy-intensive history: mountains of ore that have been mined (bauxite, say, for aluminum cans), coal plants and oil refineries, railcars, assembly lines. A product’s true cost includes greenhouse gases emitted in its creation as well as use, and pollutants that cause acid rain, smog, and fouled waterways.

Recycling—substituting scrap for virgin materials—not only conserves natural resources and reduces the amount of waste that must be burned or buried, it also reduces pollution and the demand for energy. “You get tremendous Btu savings,” Hale says.

In an international study published last year by the Waste & Resources Action Programme, a British group, researchers compared more than 180 municipal waste management systems. Recycling proved better for the environment than burying or burning waste in 83 percent of the cases.

It makes sense to reuse products, of course, and to reduce consumption altogether, as well as to improve initial product design. But given the rising mounds of waste worldwide, it also makes sense to recycle.



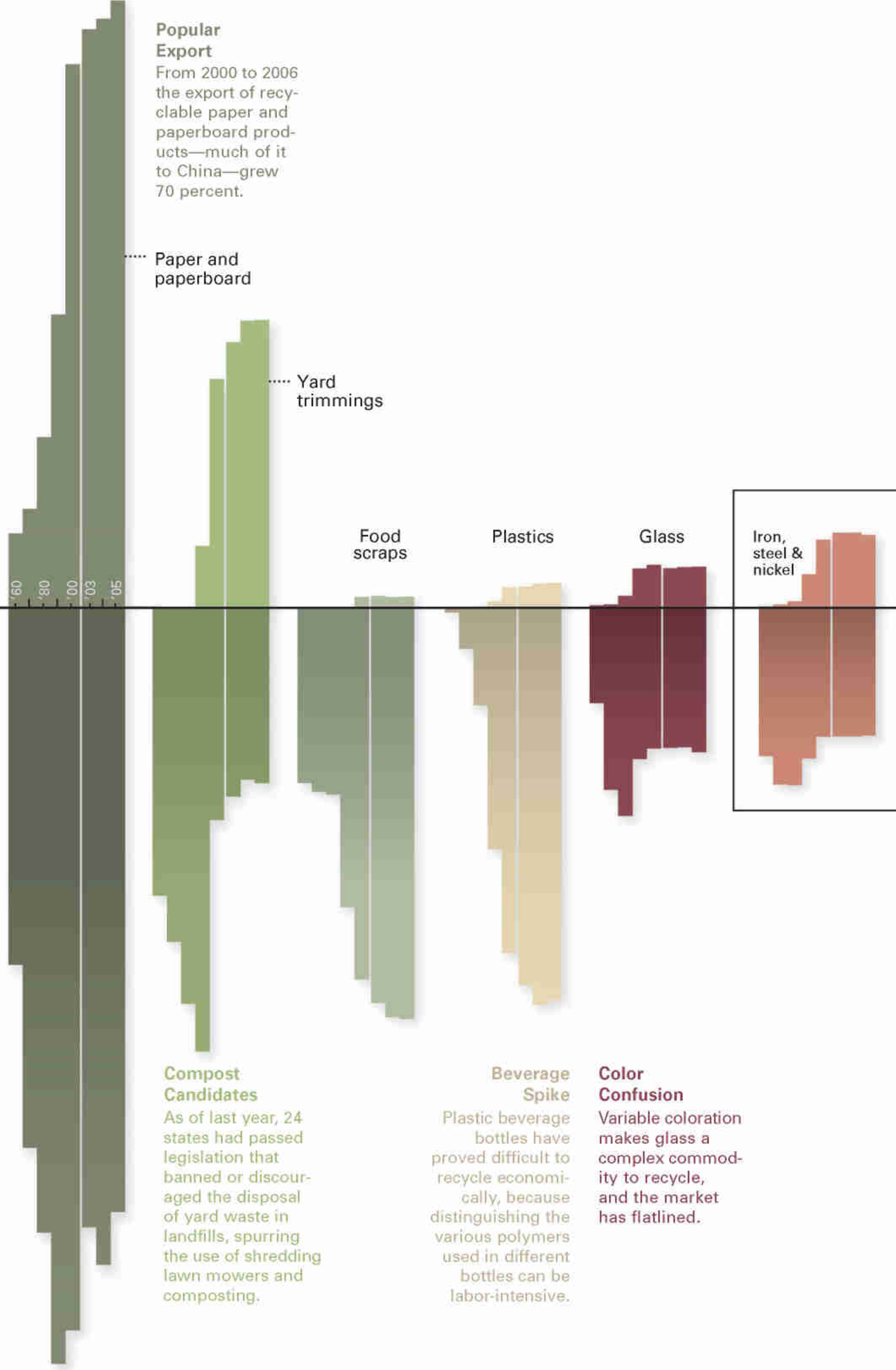
40 million tons

20

20

40

RECYCLED
INCINERATED OR LANDFILLED



Popular Export
From 2000 to 2006 the export of recyclable paper and paperboard products—much of it to China—grew 70 percent.

Paper and paperboard

Yard trimmings

Food scraps

Plastics

Glass

Iron, steel & nickel

Compost Candidates
As of last year, 24 states had passed legislation that banned or discouraged the disposal of yard waste in landfills, spurring the use of shredding lawn mowers and composting.

Beverage Spike
Plastic beverage bottles have proved difficult to recycle economically, because distinguishing the various polymers used in different bottles can be labor-intensive.

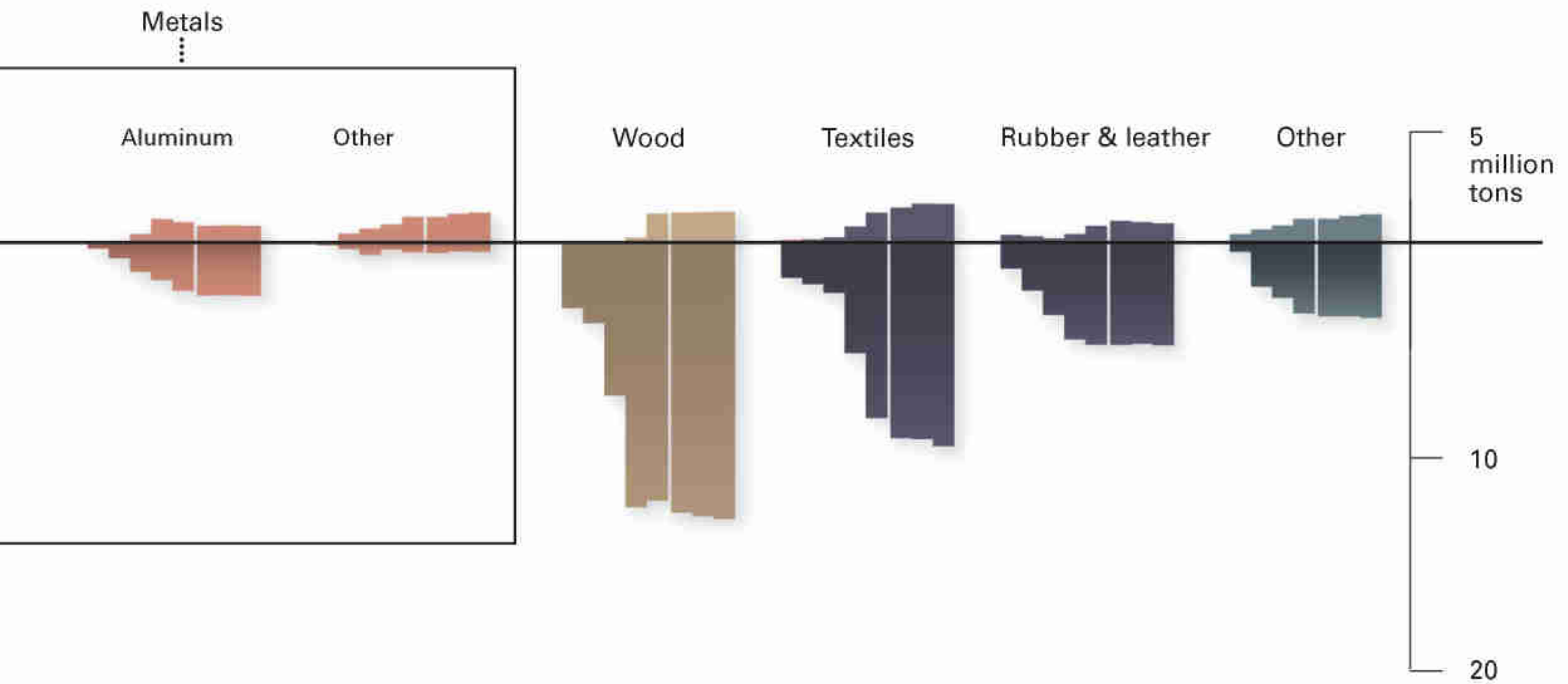
Color Confusion
Variable coloration makes glass a complex commodity to recycle, and the market has flatlined.

WHAT GETS RECYCLED IN THE U.S.

IT DEPENDS ON THE MARKETS

Whether or not a particular material is recycled depends on a number of factors, but the most fundamental question is this: Is there a market for it? Markets for some materials, like car batteries, are highly developed and efficient—not least because strict regulations govern their disposal—and a mature recycling infrastructure has grown up as a result. About

90 percent of all lead-acid batteries are recycled, according to the EPA. Steel recycling, too, has been around for decades, while formalized recycling of yard trimmings has not. Despite the explosive growth of plastics—particularly for use in beverage containers—that industry has been slow to develop a recycling infrastructure, with most plastic still going to incinerators or landfills.



Foiled Aluminum

The typical aluminum can contains about 40 percent post-consumer, recycled aluminum. But the supply of cans in the market is shrinking because of an increased use of plastic for beverage containers.

SOURCE: MUNICIPAL SOLID WASTE IN THE UNITED STATES: 2005 FACTS AND FIGURES, COMPILED BY FRANKLIN ASSOCIATES AND EPA, OCTOBER 2006.

EXCESS PACKAGING

TAKING CHARGE OF DISCARDS

Higher hygiene standards, smaller households, intense brand marketing, and the rise of ready-made meals have all contributed to an increase in packaging waste, but international trade may be the biggest factor.

Even simple items like bottles of water now routinely crisscross the globe, meaning that thirst for a few swallows of “product” can generate not just plastic bottles, but also a large amount of other packaging debris—from wrapping film to bin liners to shipping crates.

So far, Europe has led the world in recycling packaging materials—principally through the Packaging and Packaging Waste Directive of 1994. The EU directive calls for manufacturers, retailers, and others in the product chain to share the recycling burden.

With the exception of hazardous wastes, the United States has been slower to embrace the concept of “extended producer responsibility,” as the idea is known, according to Bill Sheehan, director of the Product Policy Institute, a nonprofit research organization in Athens, Georgia. Some municipalities, however, are starting to demand that businesses help cover the costs of recycling.

“Otherwise,” Sheehan says, we are “just stimulating the production of more stuff.” □

100%
Glass
recycled

Glass and Paper Packaging

The **number** on each sphere is a country's total recycling of glass and paper packaging in **millions of tons**. The **position** of a sphere reflects a country's **rate of recycling** both materials. The U.S., for example, leads in tonnage, but lags in percent recycled.

72

64

European Union average for glass

58 %

56

55

44

41

39

34

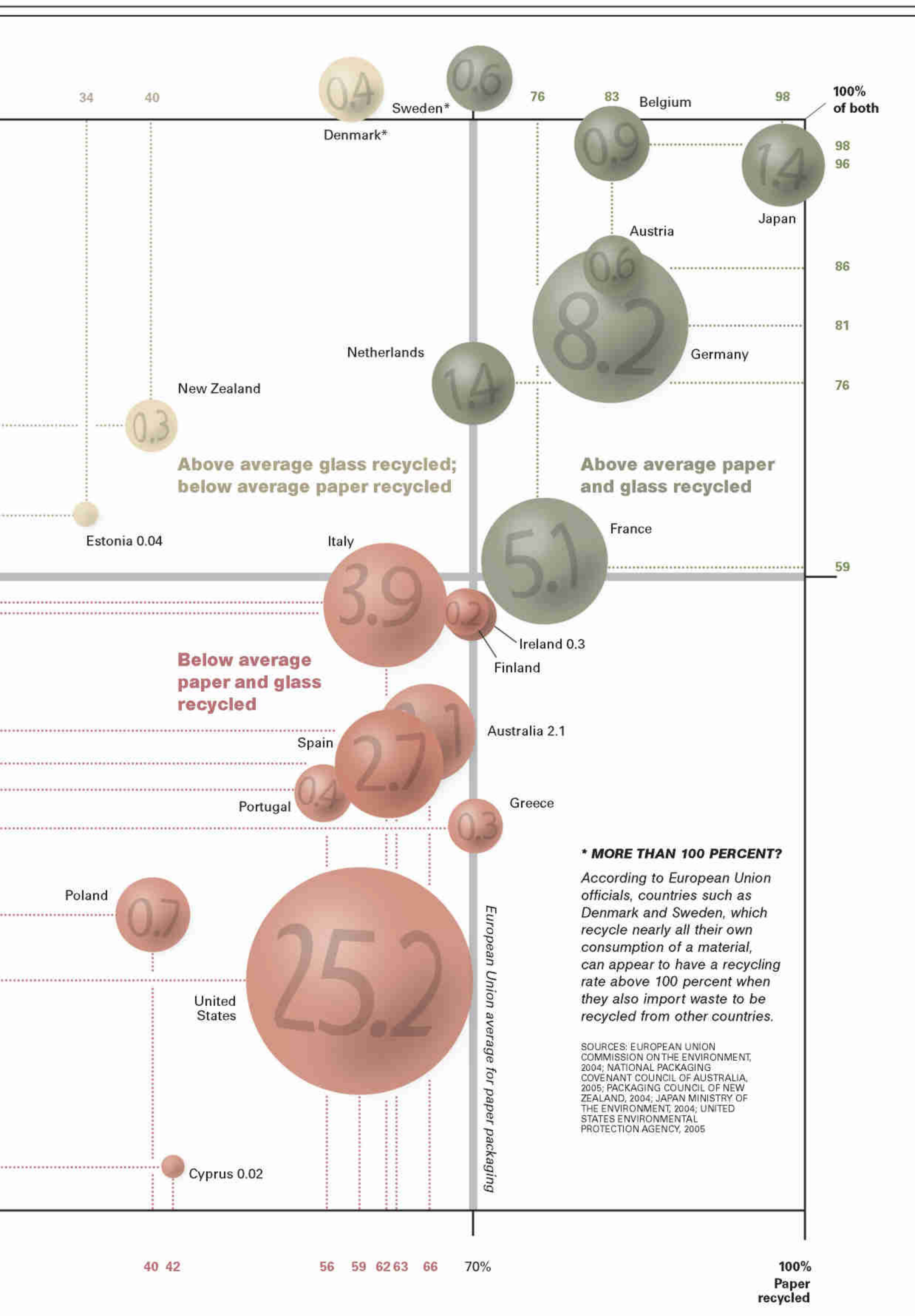
27

21

4

% OF GLASS RECYCLED

% OF PAPER PACKAGING RECYCLED



**Above average glass recycled;
below average paper recycled**

**Above average paper
and glass recycled**

**Below average
paper and glass
recycled**

*** MORE THAN 100 PERCENT?**

According to European Union officials, countries such as Denmark and Sweden, which recycle nearly all their own consumption of a material, can appear to have a recycling rate above 100 percent when they also import waste to be recycled from other countries.

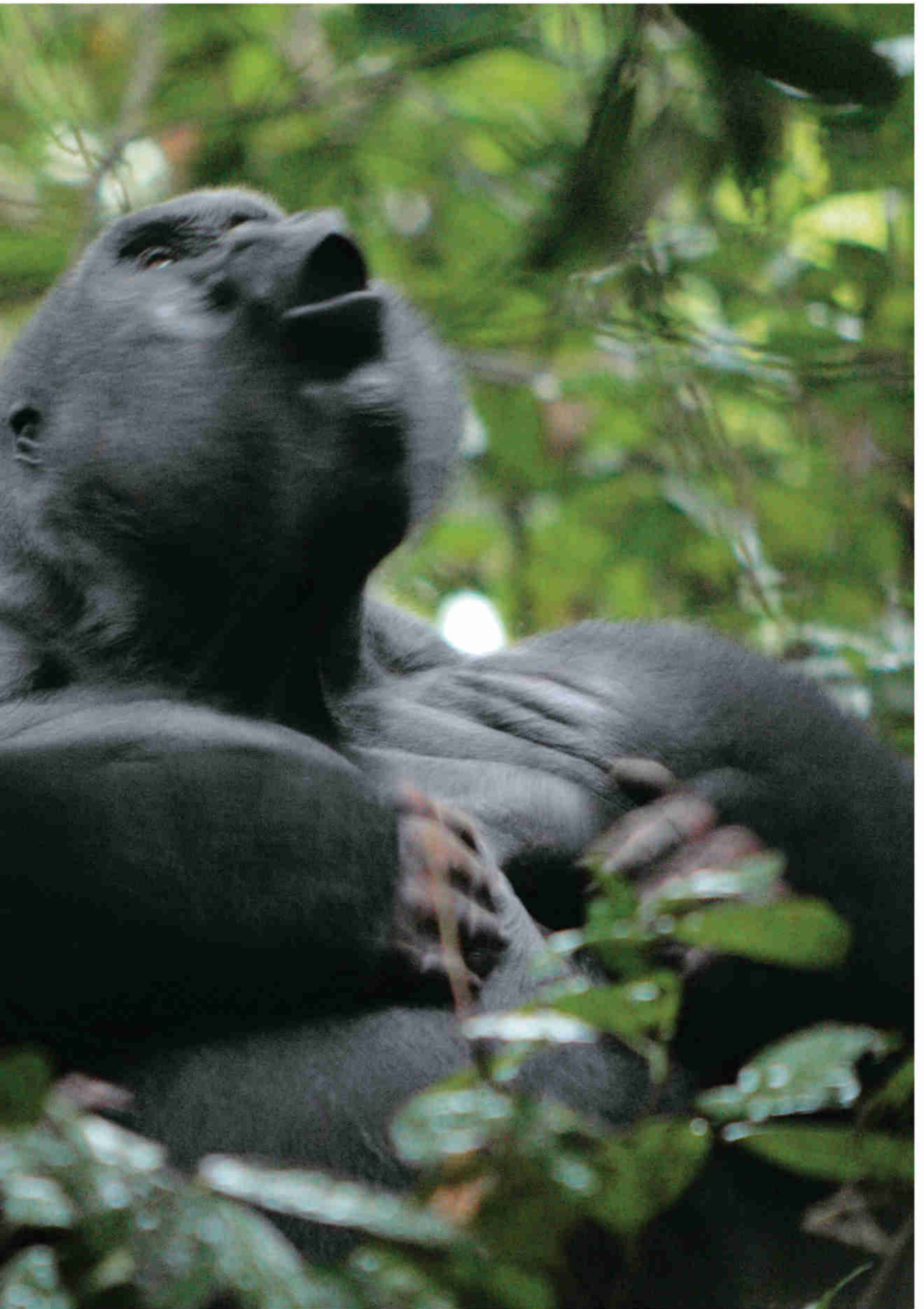
SOURCES: EUROPEAN UNION COMMISSION ON THE ENVIRONMENT, 2004; NATIONAL PACKAGING COVENANT COUNCIL OF AUSTRALIA, 2005; PACKAGING COUNCIL OF NEW ZEALAND, 2004; JAPAN MINISTRY OF THE ENVIRONMENT, 2004; UNITED STATES ENVIRONMENTAL PROTECTION AGENCY, 2005

European Union average for paper packaging

40 42 56 59 62 63 66 70% 100% Paper recycled

IN THE **PRESENCE** OF GIANTS

Booming hoots and rapid-fire chest beats announce a patriarch in northern Congo's Djéké Triangle. Kingo and his family of western lowland gorillas are giving researchers an intimate glimpse into their private lives.



Gorilla hierarchy plays out in the treetops. Kingo shares the canopy with favorite female Mekome and her son, Ekendy ("infant of the most-loved mother" in the local language). At far left sits adolescent female George, lowest in rank, her own mother gone to find a new mate. Nearly sexually mature at about eight years old, she, too, will soon leave the group.







“They squealed with laughter like little girls on a trampoline,” recalls the author. But Kusu and Ekendy are all boy, climbing, tumbling, and shrieking “in a very child-like way.” All in good fun, play helps teach essential gorilla social skills.

By **MARK JENKINS**

NATIONAL GEOGRAPHIC CONTRIBUTING WRITER

Photographs by **IAN NICHOLS**

This is the story of a family like no other:

the monstrous, solitary patriarch and his four ever competing, ever contriving wives, each with her own needy child, and motherless George—ten beings intimately bound together, in their own world, living each long day in a baroque, sweltering landscape swarming with bugs and butterflies.

Consider the four wives: Mama, Mekome, Beatrice, and Ugly. Mama may be the bossy matriarch, but Mekome is Big Daddy's favorite, and everyone knows it. Beatrice, big-hearted and benevolent, cheerfully ignores it all. And Ugly is asocial, avoiding the entire family. Each mother is hell-bent on protecting and promoting her own offspring. Mama and Mekome have little boys, Kusu and Ekendy, boon companions constantly up to mischief. Beatrice and Ugly have newborns, wide-eyed Gentil and long-limbed Bomo, and carry them everywhere.

Today, as every day, the heavy-shouldered patriarch is eating alone. No one is allowed near him when he dines. It is midday, the heat and humidity suffocating. Stingless bees buzz about his ears, flies cover his food, but he doesn't notice. He sits with his belly protruding over his thighs, chews ruminantly, and looks about with a bored expression.

After lunch, it's siesta time. He lies back in the hot shade, throws out his powerful arms, heaves his deeply muscled chest, and instantly falls asleep. Mekome deftly slips up near him and lies down. Beatrice happily begins

suckling Gentil, distant Ugly starts nursing Bomo, George settles down alone, and the boys begin to play. Kusu and Ekendy are too old for naps. While their mothers doze, the half brothers cavort near their snoring father. They chase each other round and round, tackling and tumbling, wrestling, screaming with laughter. When their high jinks get too close to slumbering Dad, he growls and they scamper off, but his enormous magnetism soon draws them back.

When sire finally rouses from his dreams, he leads his family on a stroll through the forest. The boys stay close by his side, mimicking his every move. His wives follow behind, intensely and enviously aware of each other. When he stops, they stop. When he moves, they move.

Kingo, a 300-pound silverback, is truly king of the jungle.

KINGO AND HIS FAMILY of western lowland gorillas live comfortably in a tract of protected jungle that spans the border of the Republic of the Congo and the Central African Republic. Buffered by Nouabalé–Ndoki National Park to the east and the Dzanga–Ndoki National Park in the Central African Republic to the west, their homeland is one of the last chunks of pristine rain forest left in the Congo Basin. Even so, nearby forests have been logged, which often opens up access for poachers, who kill gorillas for bush meat. Without the efforts of Diane Doran-Sheehy, a professor of anthropology

at Stony Brook University in New York State, Kingo's jungle would already be gone.

Since 1995, Doran-Sheehy has spent up to six months a year studying the gorillas. The area she chose was part of a logging concession, but in 2004, in collaboration with the Wildlife Conservation Society, she helped persuade the forest products company Congolaise Industrielle des Bois to give the gorillas a 39-square-mile (100-square-kilometer) stretch of primordial forest called the Djéké Triangle.

During her first year, with grants from the National Geographic Society and the Leakey Foundation, Doran-Sheehy established the Mondika Research Center, along the Mondika stream, and hired a crew of BaAka Pygmies from the Central African Republic to track the animals. Unlike mountain gorillas of the Virunga Mountains where Rwanda, the Democratic Republic of the Congo, and Uganda meet, which number fewer than 700, western gorillas inhabit swampy forests a few hundred feet above sea level. (Gorillas are classified into four subspecies: mountain; eastern lowland, or Grauer's; Cross River; western lowland; plus Bwindi, an eastern gorilla subpopulation.) Nobody knows how many there may be, but they are declining at an alarming rate. Ravaged by the Ebola virus and squeezed by habitat loss, their population may have been cut by more than half since the 1990s, when the best guesses put it at about 100,000. In September 2007 their status was changed from endangered to critically endangered. Even though all gorillas found in zoos around the world are western gorillas, little is known about their behavior in the wild.

Doran-Sheehy came to the Congo Basin to find out how the search for food shapes the gorillas' social behavior, reasoning that western lowland gorillas must eat a different diet than their cousins in the mountains. Mountain gorillas have long, thick, black mossy hair to

keep them warm in their cool climate, while western lowland gorillas have thin, short hair that can be brownish to brilliant red on top.

Shy, hyper-wary creatures, gorillas flee from encounters with humans, one of their few natural predators. But to study them, you must be able to observe them. To observe them, you must accustom them to your presence. As Dian Fossey, the celebrated mountain gorilla researcher, found out in Rwanda, this takes years of closely following a silverback and his family—essentially living with the gorillas. It took six long years for Doran-Sheehy and her crew just to locate and track Kingo's family, to which they gave names. It took two more years to win the family's trust.

"Habituation could not have been accomplished without the BaAka trackers," Doran-

Shy, hyper-wary creatures, gorillas flee from encounters with humans. To study them, you must accustom them to your presence.

Sheehy says. "The BaAka know the forest, they understand gorillas, and their skills as trackers are stunning and essential."

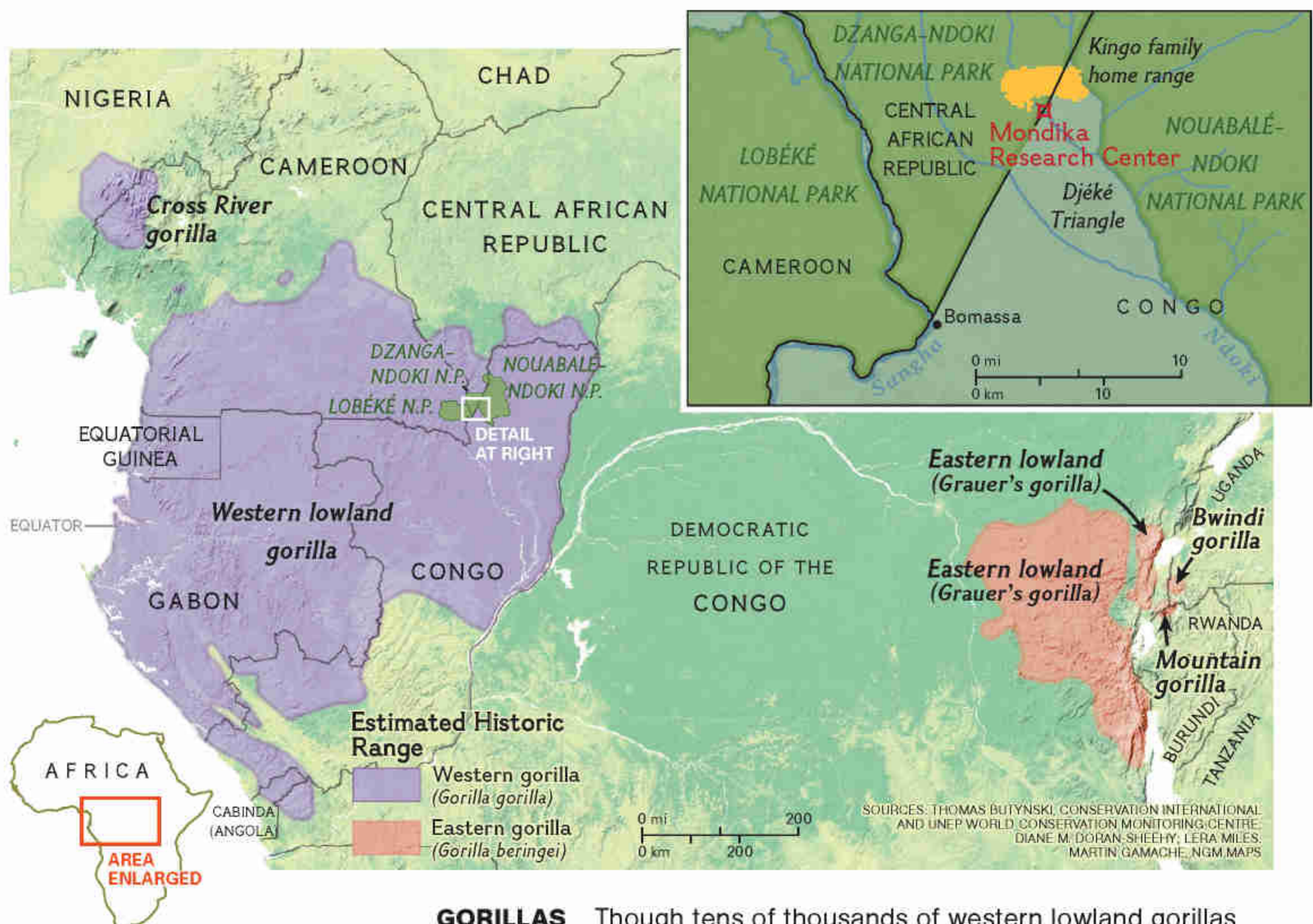
Patrice Mongo, an indefatigable Congolese researcher with a master's degree in anthropology from Stony Brook, is the field director at Mondika. He oversees the daily activities of the BaAka Pygmy trackers and has an almost mystical faith in their abilities.

"They evolved in the forest," he says one night in the Mondika camp, slapping at flying ants in the flickering candlelight. "They can see things we cannot see, smell things we cannot smell, hear things we cannot hear."

Mongo, 38, explains that the word *kingo* means "voice" in Mbenzele, the dialect of Mondika's trackers.

"At the beginning of habituation, without even seeing him, the trackers could distinguish his

This is the first article in National Geographic for both author Mark Jenkins and photographer Ian Nichols, whose father, Michael, is a staff photographer.



GORILLAS IN PERIL

Though tens of thousands of western lowland gorillas remain in the wild, they are endangered (as are all gorillas in central Africa) by habitat loss, disease, and poaching. Kingo's homeland is buffered by parks.

particular vocalizations from that of other silverbacks in the area. That's how we first got close to Kingo. He had a particularly deep-chested roar."

Doran-Sheehy soon confirmed, as she and others before her suspected, that the western gorillas' diet is radically different from that of mountain gorillas. Mountain gorillas eat mostly herbs—wild celery, nettles, bedstraw. Western lowland gorillas have a more diverse diet of fruit, leaves, and herbs. They also consume termites, as well as waxy green *ngombe* leaves and the bark of favorite trees. During certain times of the year, western gorillas are practically fruitarians, seeking out jungle delicacies such as *bambu*, a seedy red fruit the size of a peach, or *mobei*, a large yellow fruit that resembles a pineapple. At such times, fruit can make up 60 to 70 percent of their diet.

In search of their favorite fruits and other

foods, western gorillas typically travel about 1.2 miles (two kilometers) every day, almost four times as far as mountain gorillas. This extensive search shapes family dynamics, Doran-Sheehy has learned. Individual western lowland gorillas are more independent than mountain gorillas. Although they show affection to one another, there's little mutual grooming or other physical contact, and each individual spends considerable time alone. Which means that the females, and even the youngsters, can sometimes be relatively far away from the safety of the silverback—sometimes making it hard for Kingo to protect his family.

"One morning the trackers went out at dawn, as usual," Mongo says at the Mondika camp. "Suddenly they came running back into the camp shouting about an attack. When I got out there, I found Ugly's baby, Samedi, lying on the

ground. Blood everywhere and deep gouges in the ground. Samedi had been mauled by a leopard. We radioed the wildlife vet, but Samedi was too far gone.”

THIS MORNING THE TRACKERS are moving swiftly through the jungle, gracefully ducking vines and leaping roots as they’ve done their whole lives. It takes an hour to reach the spot where the gorillas were last seen the night before. From there, the three trackers spread out, searching for signs. “They can spot the one leaf on a tiny plant that is turned sideways,” Doran-Sheehy had told me, “and from this alone, determine the direction the gorillas went.”

I follow in the footsteps of the oldest tracker. He suddenly stops, kneels, picks up a leaf, and points to the ground. Barely visible in the damp earth is a knuckle print. The tracker begins softly clicking his tongue. Another answers with three clicks that go up the scale.

This is a simple language gorilla researchers developed to announce their presence to the gorillas—the tongue clicking tells Kingo and his family, “it’s just us, the same strange creatures you see every day, the creatures that will not harm you or take your food or kidnap your wives.”

The trackers follow multiple trails, talking to each other through faint tongue clicks. After ten minutes, they have all converged onto one path, trotting in single file. Fifteen minutes later they’ve found the gorillas.

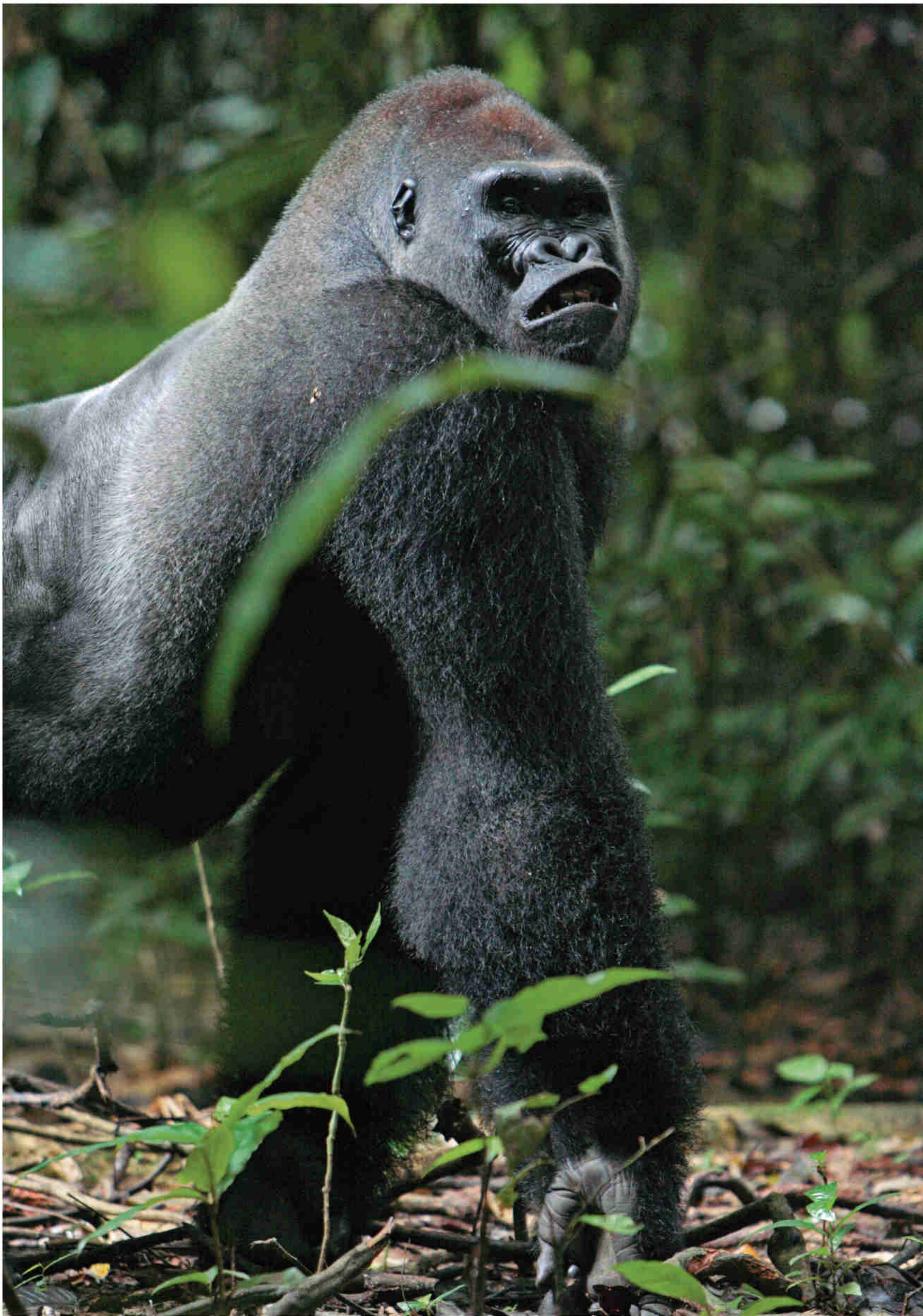
The whole family is a hundred feet up in a tree having breakfast. Kingo is sprawled leisurely in the crotch of two big limbs, plucking leaves and plopping them into his mouth like bonbons. Mekome is near Kingo. Mama, Beatrice with Gentil, and Ugly with Bomo are all out on a limb. Kusu and Ekendy are perilously racing up and down a branch as if they were only three feet off the ground.

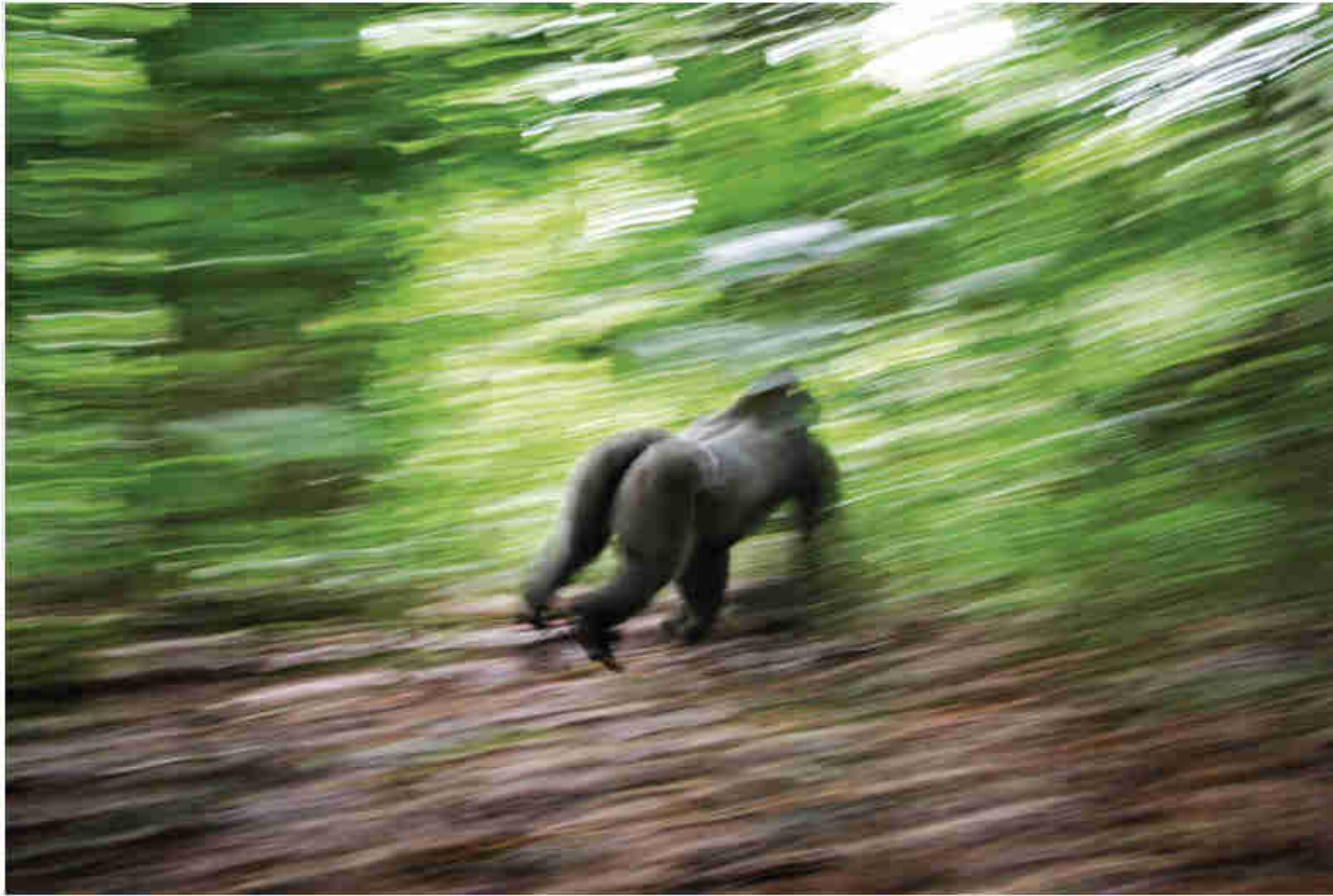
The two youngsters, although foraging for themselves, are still nursing. They’re each about two years old and won’t begin to reach maturity until eleven or twelve. By then they’ll most likely be bachelors, living on their own in the forest, hoping to get their own harem started.





Lips gummy from *bambu* fruit, Beatrice keeps lunch close and baby closer. Weeks-old Gentil will be cradled or piggybacked for the first four months of life. Cropped hair and redheadedness are western gorilla traits; mountain gorillas are darker and shaggier to withstand the chill at higher elevations.





**KINGO'S
DOMAIN**

Lording over a six-square-mile (15-square-kilometer) home range, Kingo knuckle-walks on arms as thick as tree limbs (left). A noisy charge through the jungle (above) may be to intimidate nearby rivals, one of Kingo's main jobs as protector of his family. Needing fuel for his efforts, the silverback soaks in a swamp for hours (below), methodically stripping and rinsing dirt from herb roots before munching.



Females begin to reach adulthood around seven or eight, and will start looking for a mate. Calculating Kingo's age is guesswork, but Mongo thinks he's around 25 to 30 years old. If western lowland gorillas have life spans similar to those of mountain gorillas, Kingo should live into his mid-30s.

"There is still so much research to be done," Mongo says under his breath.

The age of the females is unknown, except for George, who is about eight (and who was mistaken for a male when she was little, hence her name, which the crew got used to and kept). The sole adolescent, George is the lowest ranking female, an unenviable position. Her mother, Vinny, possibly feeling sexually neglected (it can be difficult, even for the most hairy-chested silverback, to satisfy a harem), followed

It takes an hour to reach the spot where the gorillas were seen the night before. From there the trackers spread out, searching for signs.

the lead of estranged wife number one, Ebuka, who left in 2005 and ran off to find herself a more responsive mate. With Vinny gone, Beatrice noncommittally looked after George when Beatrice's first baby, Mercredi, mysteriously died. But the moment Gentil was born, Beatrice turned her attention to the newborn.

Females usually give birth to a single infant after a gestation of eight-and-a-half months and nurse for about three or four years. When nursing ends, they are ready to mate again. Infant mortality can be as high as 50 percent (all of Kingo's known wives have lost at least one child), and when a mother loses a child, she resumes her estrus cycle immediately. That's how Ugly became pregnant with Bomo just two months after Samedi was killed by the leopard.

Once Kingo has eaten all the food he can lazily reach, he descends, grabbing a hawser-size

vine and sliding down through midair like a fireman. In minutes, the rest of his clan, one by one, have all twirled down the mighty vine.

Their path through the forest is frustratingly erratic. Left, right, looping left again, Mongo recording each change in direction on a GPS device. But Kingo knows where he's going and shortly reaches his destination, a gigantic *Gambeya* tree. It's the end of the dry season, and there's little bambu fruit on the ground. Kingo tears open a small red globe, chews out the flesh, discards the rind. Kusu, right on his heels, takes up the rind and gnaws away. Ekendy gets Kingo's next leftover. Still, there's not enough fruit to keep Kingo's interest, and he moves on.

They are nonchalantly grazing their way through the forest when George happens to discover a mobei fruit on the ground. She hungrily begins ripping it open with her teeth while simultaneously trying to keep quiet about it and sneak away from her relatives. No luck.

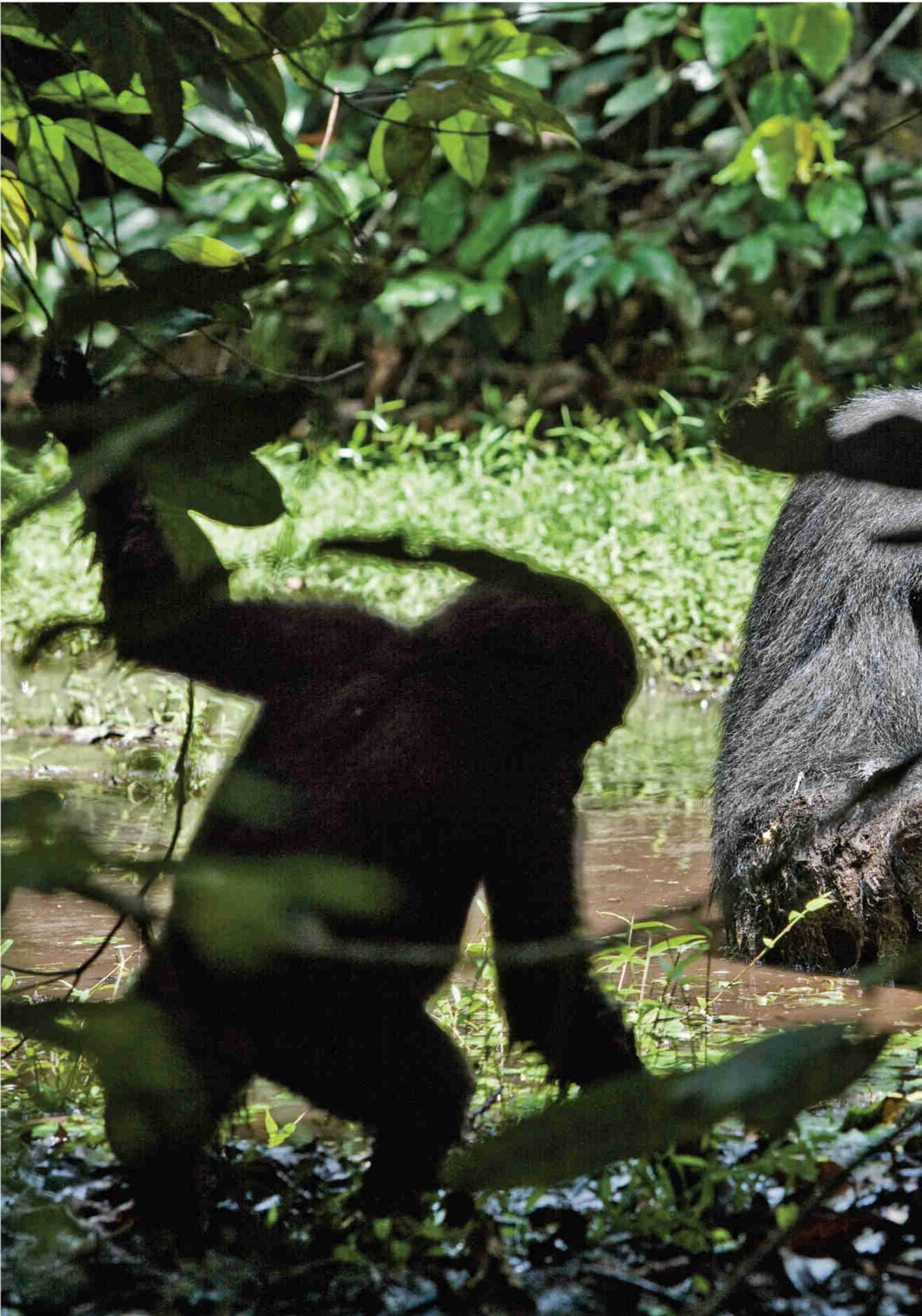
Kingo, keenly aware of food of any kind, either smells the fruit or hears George eating. Instantly he is pounding through the jungle, bellowing. George cowers, and he knocks her down and snatches the fruit from her grasp. George whimpers and scuttles away while Kingo sprawls out on his fat stomach, props his elbows up on the ground, and gorges. "Food is everything for Kingo," Mongo whispers.

Eat, sleep, move. Eat, sleep, move. That's the life of a gorilla.

The total range of the Kingo family is about six square miles (15 square kilometers), sections of which overlap with the ranges of other gorilla families. At least nine other groups inhabit parts of Kingo's home range. Western lowland gorillas are not territorial, and their relatively frequent encounters with other groups of gorillas are often surprisingly peaceful. By contrast, groups of mountain gorillas are almost always aggressive with one another, with chest-beating, screaming, and charging. Doran-Sheehy has shown that dominant males in western gorilla families may be related (such as brothers, half brothers, or fathers and



Naps are for adults. As his mother, Mekome, drifts off, young Ekendy rests with eyes open, ready to spring up for playtime. Despite their relaxed sprawls in the leaf litter, elders remain on alert for elephants, with whom they compete for food, and stealthy predators such as leopards.





Not ready for deep water, tiny Kusu plays at the edge of his family's favorite swamp but remains within Kingo's protective reach. The young ape watches and likely learns from Kingo's actions, mimicking the feeding behaviors he'll need when he's old enough to make his own swamp visits.

sons), which may help explain their remarkable tolerance of one another.

Late that afternoon, Kingo is traveling fast—no stopping, no dawdling—his huge arms pulling him through the tangled verdure. His family races along behind him. To keep up, Kusu hitches a ride on Mama's back, Ekendy piggybacks onto Mekome, Gentil and Bomo cling like ticks to their mothers' breasts.

They're moving so fast we lose them in the jungle. But the trackers are not worried. They know where Kingo is going: to the swamp.

The next morning it takes two hours to reach the gorillas. The trail descends into stagnant pools of green water and crotch-deep mud beneath a ceiling of thorn-encrusted lianas. And yet, when we finally break out into a clearing, it's a scene as idyllic as the jungle gets.

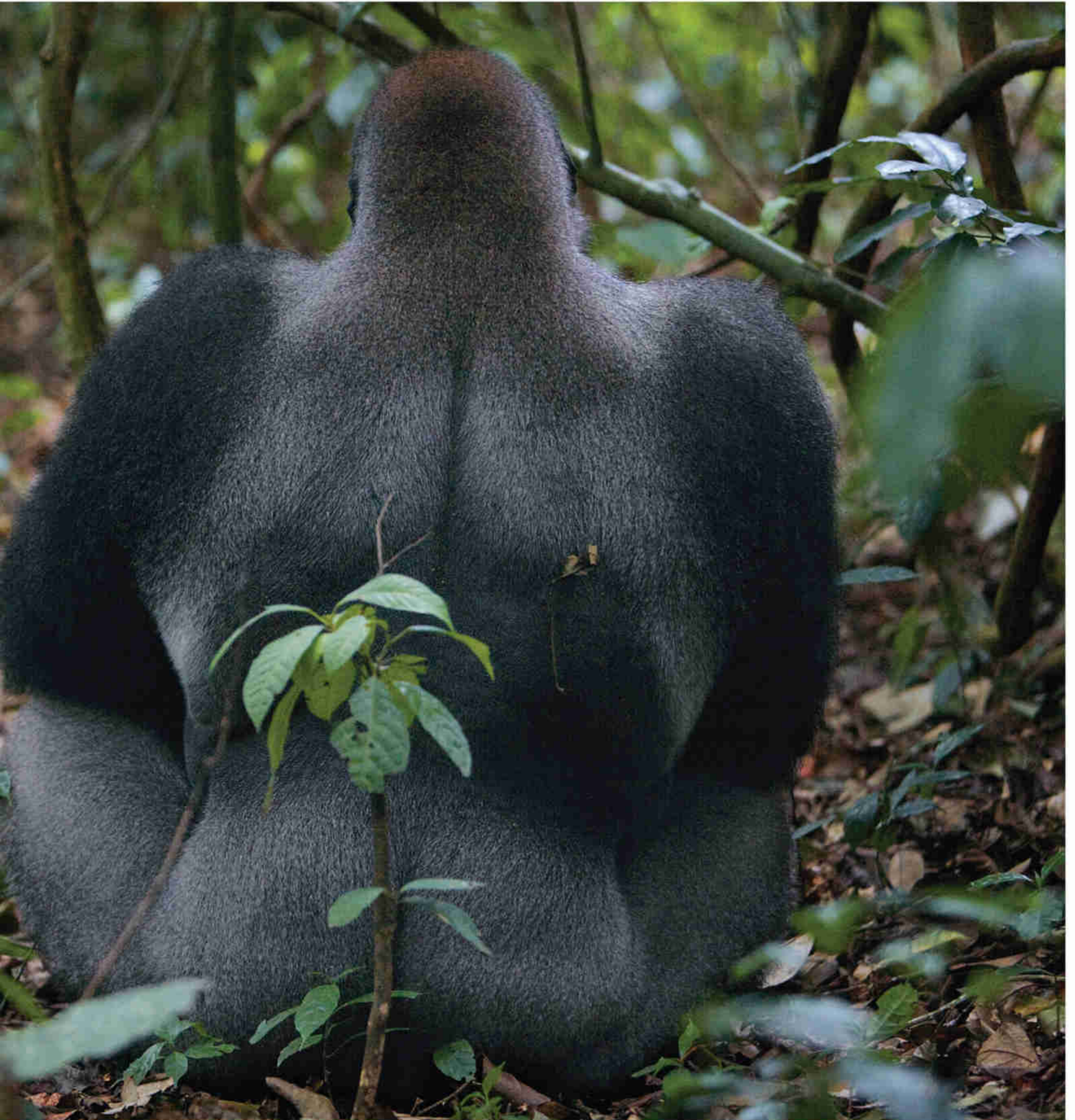
Butterflies the size of birds flit about in the sunshine; spiders as big as a child's hand are sunning themselves on roots; frogs are belching, dragonflies darting, bugs humming, and all manner of birds piping or cawing, hooting or cooing. And right in the middle is Kingo. He's up to his chest in a pond, pulling up the stringy roots of *kangwasika* swamp herbs, washing them in the water, then sucking them down like spaghetti. Seated smack in his own salad bowl, he couldn't be happier.

Actually, the whole family appears pleased. None of them can get near Kingo, of course, but they've each found their own place in the sun. Ugly is a little distance away, gently holding Bomo as if she's about to give the baby a bath. Kusu and Ekendy are heard but not seen, crashing gleefully through the reeds. George is unseen and unheard. Beatrice is nursing quietly in her own serene patch of swamp. Mekome is seductively edging into Kingo's pond. And Mama is up a tree nimbly popping termites into her mouth.

Just one big happy family. □



➤ **Focus on Gorillas** Kingo and his troop are the stars of a multimedia slide show by photographer Ian Nichols. Get more information about how to help these endangered animals at ngm.com.



Kingo sits solo—but is not alone in his quest to survive. Conservationists have persuaded loggers to leave standing the Djéké Triangle's nearly 40 square miles of pristine wildlife habitat. With gorillas in grave danger, such efforts are the best hope to help these apes beat the odds.



NUMBING COLD, GALE-FORCE WINDS,
AVALANCHES, FROSTBITE. WHY RISK YOUR
NECK ON PAKISTAN'S **NANGA PARBAT** IN THE
MIDDLE OF WINTER? ASK POLISH CLIMBERS.

ICE

WARRIORS

Skirting a 5,000-foot drop-off, Dariusz Załuski battles icy blasts of wind. When winter descends, the Poles own the Himalaya, with first winter ascents of 8 of the world's 14 tallest peaks.





Savage winds whip Nanga Parbat's majestic Rupal Face. Scores have died on this mountain, and all previous winter expeditions have failed. In late 2006 a Polish team of nine makes a bold new try for the top.



PHOTOGRAPHS BY TOMMY HEINRICH

UNSPEAKABLE COLD. A cold so unearthly, the two Polish mountaineers, even in their benumbed state, recognize it for what it is: the angel of death. She has wrapped their wasted bodies in her icy wings and is feeding on them while they're still alive—gnawing at their wooden fingers and frozen toes, eating away their waxy cheeks and hardened noses.

It is the 12th of January, 2007, the dead of winter, in Pakistan's Karakoram Range. Darek Załuski and Jacek Jawień are pinned down inside their tent at 22,146 feet (6,750 meters) on the southwest ridge of Nanga Parbat, Earth's ninth highest mountain. Everything is frozen solid—boots, socks, sunscreen, water bottles—as if left over from some ghastly ice age. They remove batteries from inside their underwear, fumble them into the radio, and call Base Camp. The wind is shrieking, snow strafing their nylon tent. Only a few desperate words can be made out.

"Wiatr... wiatr!"

The wind, the wind. Spoken like dying words. But Załuski and Jawień are not dying. Unbelievably, they are trying to decide whether to go up, or go down.

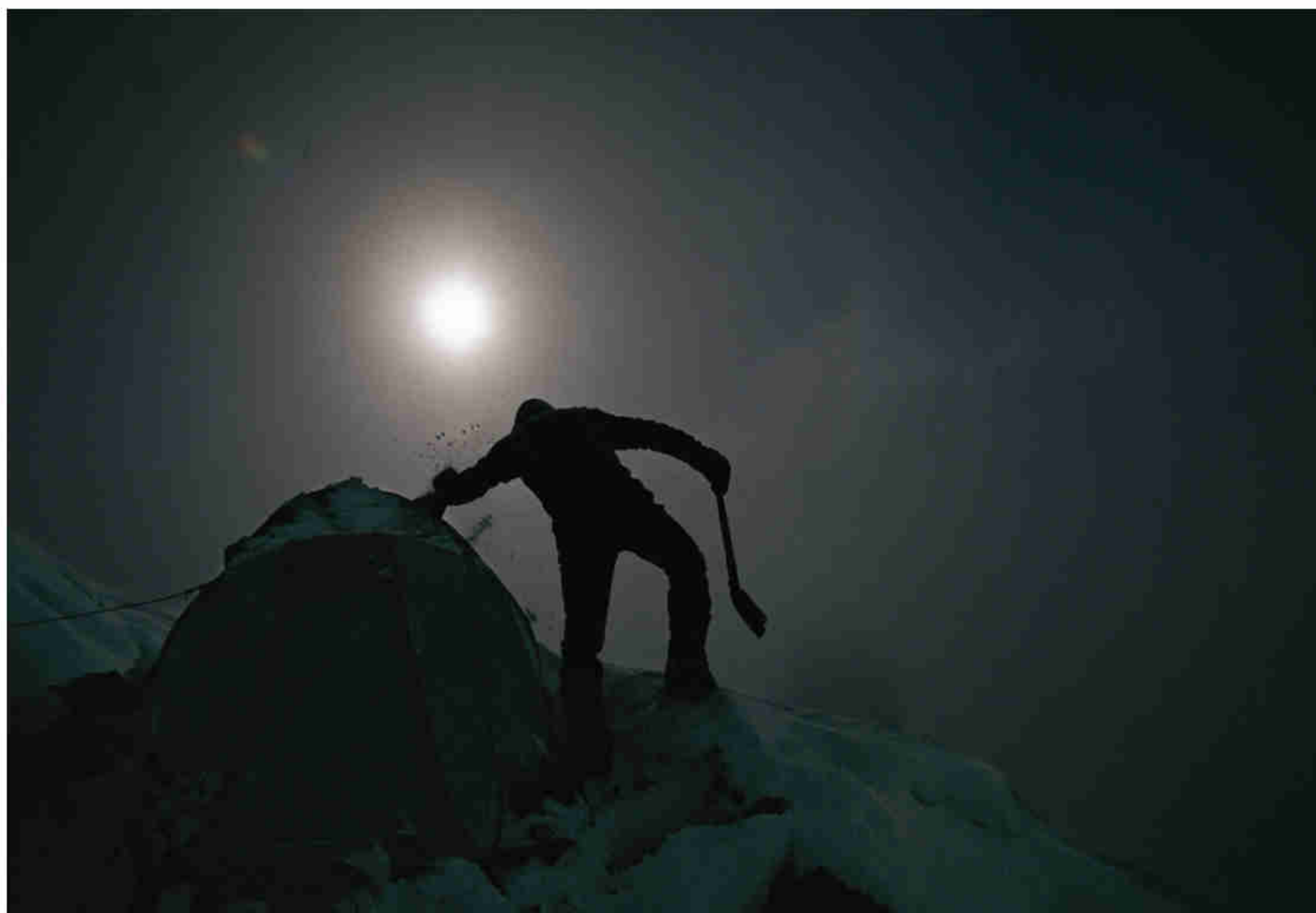
They have not slept for two days. They reached Camp 3 on the ridge the day before and spent the night huddled inside their tent, clinging to the poles to keep them from snapping in the wind. The temperature is minus 40°C, the wind gusting at 60 miles an hour. They are wearing everything they have—layers of fleece,

thick down suits, gloves inside mittens, hoods, and masklike balaclavas. Exposed skin quickly suffers frostbite. They have cocooned themselves in their foot-deep sleeping bags, but still they are shivering uncontrollably, their speech slurred, body movements jerky. Even in this fugue of misery, they understand and accept the situation. They are Polish, after all, and this is a peculiarly Polish pursuit: high-altitude winter mountaineering.

Załuski, 47, and Jawień, 30, have been here before. They are veteran Himalayan mountaineers. Two years ago they were on the first winter ascent of 26,300-foot Xixabangma Feng (Shisha Pangma) in China. Another two-man team had reached the top, and Załuski and Jawień were poised to make the second summit push when a storm slammed into the mountain. They were forced to turn around and barely made it down alive. Now it has happened again.

They have been on the mountain for 35 days. Big sponsors have paid big money to see them succeed. Websites are reporting on their progress. Poland is watching. Their comrades are watching. But so are Załuski's wife and his two teenage daughters back in Warsaw; and so is Jawień's wife in Tychy, cradling their eight-month-old daughter.

Author Mark Jenkins, who lives in Wyoming, and photographer Tommy Heinrich, who lives in Argentina, are both veteran Himalayan climbers.



DIGGING OUT As a midday snowstorm dies down, Jacek Berbeka clears snow from around a tent at Camp 1. Four camps were planned between the base and summit—a destination team members knew would require military precision and plenty of luck to reach.

If they go down, they know they will not have the strength to come back up. If they go down, perhaps no other member of the team will have the resolve to climb this high. It could be the end of the expedition.

But going up is impossible. Going up is a death sentence, a march through bludgeoning snow straight into oblivion. Even going down they might not survive. They reach a decision.

In bright red astronaut suits, they crawl out of the flapping tent into the maelstrom. Blinded by snow bulleting their goggles, knocked to their knees by the wind, they reach for a rope whipping in space, and begin to descend.

NANGA PARBAT, the “naked mountain,” is one of the most coveted prizes for Polish winter mountaineers. Four previous Polish teams have attempted it, and all have failed.

Separated from the rest of the Karakoram by the Indus River, Nanga Parbat is a lone pyramid at the western end of the Himalaya. It was the first 8,000-meter peak ever attempted, in 1895

by Englishman A. F. Mummery, and, as if to warn the world, the mountain summarily killed Mummery and his two high-altitude porters. Twenty-eight more people would die on four inglorious expeditions before Austrian Hermann Buhl reached the summit in 1953.

Polish mountaineers would have given anything, including probably their limbs and lives, to have competed for the first ascent of Nanga Parbat. After World War I, Poland was recovering from the loss of more than a million people. During the 1940s, so much of World War II was waged on Polish soil that a fifth of the population—almost six million people, half of them Jews—perished. When the Cold War set in, intellectuals, activists, and anyone else with an opinion were held down by Soviet oppression. It wasn't until the rise of Lech Wałęsa and the Solidarity trade union from the Lenin Shipyards in Gdańsk in 1981 that cracks appeared in communism's stone edifice.

This prolonged period of suffering left its thumbprint on the nation's soul, and it was



NEIGHBORS Base Camp has to be located lower than the climbers wanted, at only 11,598 feet, because the steep slopes rise so abruptly from the valley. The camp is so low that the expedition's tents are pitched beside a trail where local shepherds herd goats and sheep.

only the latest chapter in a history of sorrows. As a people, Poles had long ago learned to bear up against terrible odds, recognizing that heroes who struggle and lose may be heroes all the same. At least five times during the past millennium, conquerors had erased the nation from the map of Europe, vowing to obliterate its memory. Yet somehow the Polish identity had survived.

The same underdog spirit drove Polish mountaineers, who, during the communist era, were forbidden from joining expeditions to the Himalaya and Karakoram, thus missing out on first ascents of all the high peaks, from Mount Everest and Nanga Parbat in 1953 to Xixabangma in 1964. Instead they focused their frustration on the mountains in their own backyard, the tiny Tatras.

Mount Rysy, the highest peak in Poland, rises only 8,200 feet. Unlike the neighboring Alps, the Tatras have no glaciers or year-round snow. But

winter mountaineering, involving exponentially more pain and suffering than summer climbing—frostbite, hypothermia, avalanches—became an obsession of the Poles. The 1,762-foot Kazalnica face in the famous Morskie Oko valley became the Poles' personal El Capitan, but instead of sunny Yosemite granite, the most heralded routes were all done on icy rock.

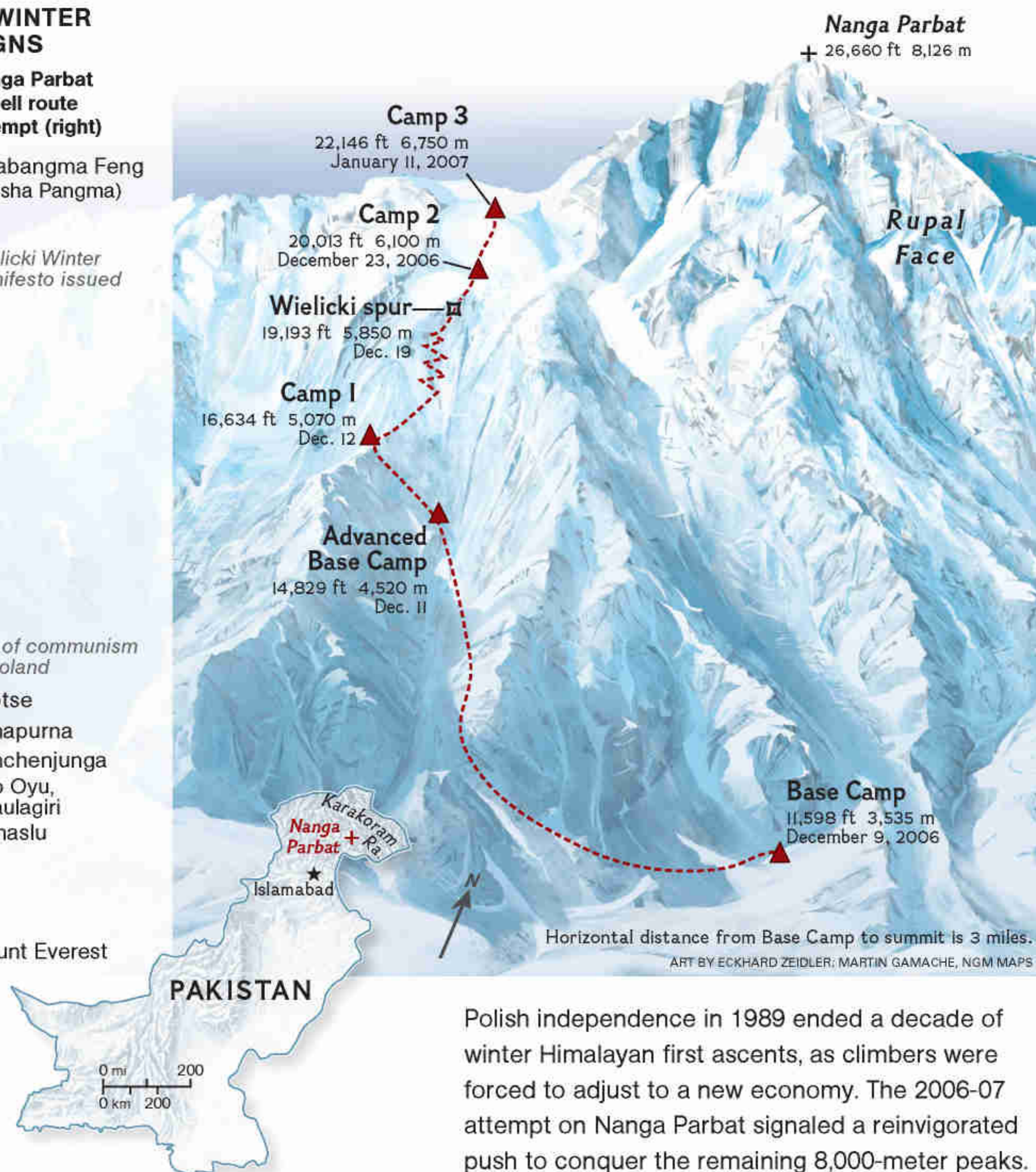
One of the early practitioners of Polish winter mountaineering was a tall, lean Roman-nosed geophysicist named Andrzej Zawada. In 1959 Zawada completed the first winter enchainment of the Tatras, ascending more than a hundred peaks and towers in 19 snowy days of continuous climbing. Dashing and charismatic, Zawada became Poland's most visible and visionary proponent of winter mountaineering. "Tell me what you have done on Kazalnica in winter," he used to tell other climbers, "and I'll tell you what you are worth."

In 1973, when the Iron Curtain was cracking just slightly, Zawada was allowed to visit Afghanistan, where he led the first winter ascent

■ **Society Grant** This Expeditions Council project was supported by your Society membership.

POLISH WINTER CAMPAIGNS

- 2007 — Nanga Parbat Schell route attempt (right)
- 2005 — Xixabangma Feng (Shisha Pangma)
- 2002 — *Wielicki Winter Manifesto* issued
- 1989 — *Fall of communism in Poland*
- 1988 — Lhotse
- 1987 — Annapurna
- 1986 — Kanchenjunga
- 1985 — Cho Oyu, Dhaulagiri
- 1984 — Manaslu
- 1980 — Mount Everest



Polish independence in 1989 ended a decade of winter Himalayan first ascents, as climbers were forced to adjust to a new economy. The 2006-07 attempt on Nanga Parbat signaled a reinvigorated push to conquer the remaining 8,000-meter peaks.

of a 7,000-meter peak, summiting 24,580-foot Noshag. The following winter, Zawada climbed above 8,000 meters on Lhotse with Zygmunt Heinrich, becoming the first to reach the “death zone” in winter. By the late ’70s, Zawada was audaciously suggesting that even Everest could be climbed in winter.

“At that time, climbing in the Himalaya in winter was going beyond what was reasonable,” says Ed Viesturs, the first American to summit all 14 of the 8,000-meter peaks.

Undaunted, Zawada persuaded the Nepalese government to issue him a permit to attempt Everest in the winter of 1979. It was the first winter permit ever granted and de facto created an official new climbing season in the Himalaya. Many climbers still

believed winter high-altitude mountaineering was suicidal. But Zawada knew something they didn’t—the Poles had been training for this for two generations. By character, by desire, and by experience, Polish mountaineers were inured to cold, wind, darkness, and danger.

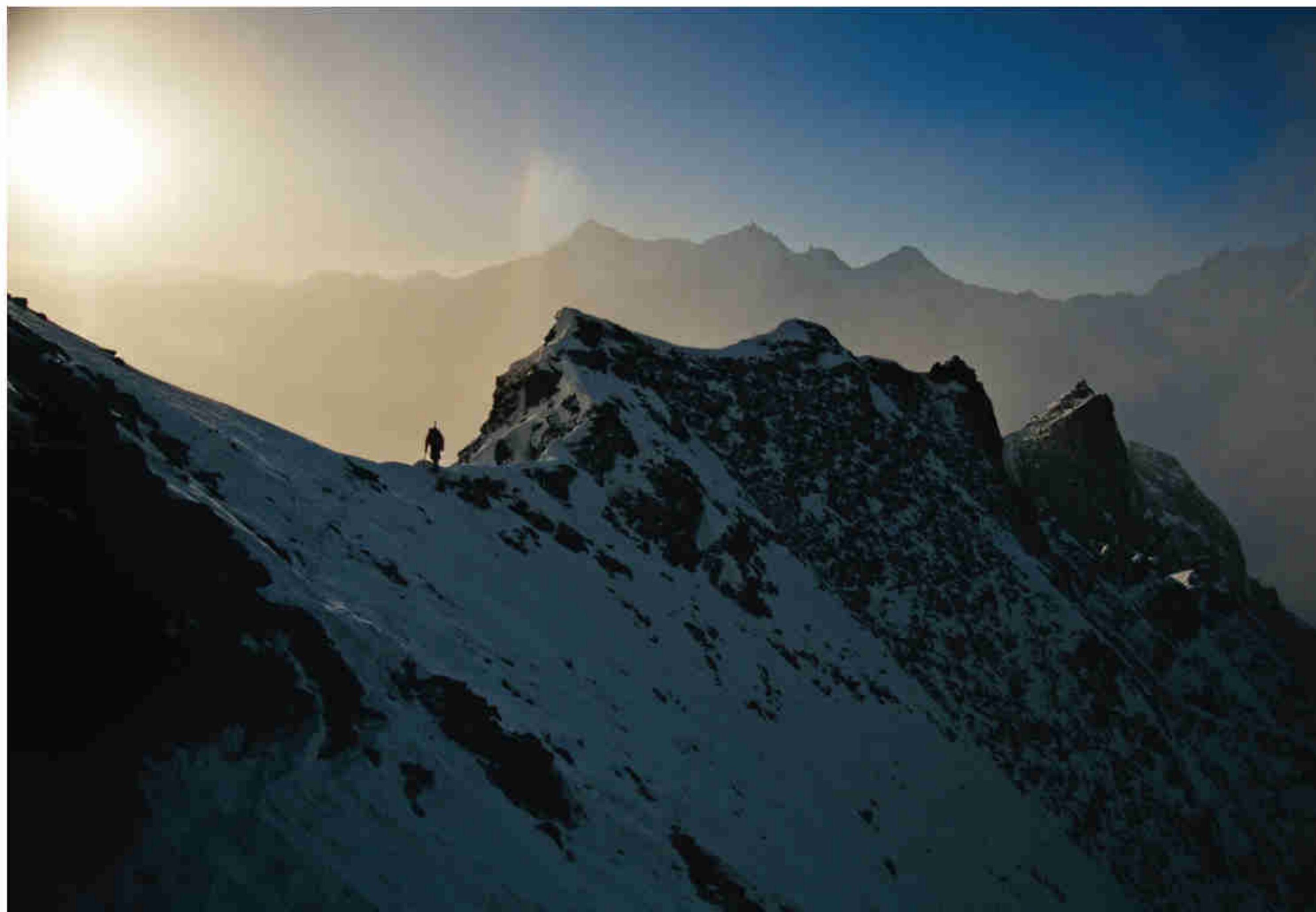
On February 17, 1980, Leszek Cichy and Krzysztof Wielicki summited Everest, the first winter ascent of an 8,000-meter peak.

DECEMBER 12, 2006. Wielicki is back in the Himalaya, leading the assault on Nanga Parbat. Climbers and high-altitude porters are ferrying loads up from Base Camp, set in deep snow beside an icy stream. Wielicki is slurping down a steaming bowl of tripe, when the radio crackles. He snatches up the receiver and responds.



Photographer Tommy Heinrich angles his camera between his boots, downhill, where expedition leader Krzysztof Wielicki, defying his 57 years, powers up a steep slope.





MAN AND MOUNTAIN A lone climber is dwarfed by Karakoram peaks as he follows a ridge toward Camp 2. High winds, frequent snows, and dangerously low temperatures dog the Polish team throughout the expedition, progressively whittling down their odds of success.

A patchy, disembodied voice fills the frosty tent. Wielicki listens intently, his snowburned eyes staring at the nylon floor. There has been an accident; an avalanche. Hassan Sadpara, an experienced high-altitude porter, has been hurt.

Wielicki nods gravely. He's seen many people die in the mountains; he's lost a dozen friends. He quietly asks how bad it is and is visibly relieved to hear it's only a banged-up shoulder. Rubbing his graying handlebar mustache, Wielicki instructs his companions to bring Sadpara down to Base Camp as quickly as possible.

A veteran of 37 expeditions to Asia, Wielicki was the fifth person to summit all fourteen 8,000-meter peaks. Besides Everest, he made the first winter ascents of Kanchenjunga and Lhotse. From 1980 to 1989, he spent six months of every year climbing. He soloed Nanga Parbat, Gasherbrum II, Broad Peak, Xixabangma, and Dhaulagiri. Essentially unknown in the U.S., Wielicki is one of the world's most successful Himalayan mountaineers.

He has assembled an unparalleled team of nine

climbers for this expedition ("I am looking for the fighters," he said). There is the old guard—Wielicki (57), Krzysztof Tarasewicz (55), Jan Szulc (50), Jacek Berbeka (47), Dariusz Załuski, and Artur Hajzer (44)—and the young guns—Jacek Jawień, Robert Szymczak (29), and Przemysław Łoziński (35). Wielicki says he's trying to "infect" a new generation of Polish climbers with "the joy of positive suffering—because if something is easy, you will not enjoy it, really."

The Poles are attempting the 1976 Schell route up the left flank of the Rupal Face, which ascends a jagged ridge with fierce gendarmes separated by steep sections of ice. Their plan calls for four camps, perhaps a summit-push bivouac, and almost two miles of fixed rope. But after only five days on the mountain, there are already problems. A foot of snow fell the day they arrived, and they have been dodging avalanches ever since.

"Winter is usually safe time to climb," says Wielicki, wiping his sharp, red nose with the sleeve of his parka. "But Karakoram is different than Himalaya. Colder, windier, wetter than I

expected.” They have also learned that their Base Camp, at the foot of the immense Rupal Face, is too low—at a mere 11,598 feet—which means the team is facing about 15,000 feet of climbing to reach the summit, an almost impossible distance in summer, let alone winter.

Despite these difficulties, the expedition moves swiftly during the first ten days. Sidestepping avalanches, they put in Advanced Base Camp at 14,829 feet on December 11, tucked safely under a rock overhang. Camp 1 is dug in on the ridge at 16,634 on December 12. The weather is nippy, minus 25°C at night, “but for Poles,” as Jawień says, “this is quite manageable.”

Spirits are high, there’s energy in the frigid air. Never mind the avalanches, the cold, the long ascent—the old Polish boldness is back.

THE 1980s, as it turned out, were golden years for Polish mountaineers. After their first winter ascent of Everest in 1980, Polish climbers became national heroes—not unlike the U.S. hockey team that pulled off the “miracle on ice” by beating the Soviets at the Olympics that year. The climbers’ faces were in the newspapers. They signed autographs and did lectures. Zawada even received a letter from Pope John Paul II, the first and only Polish pope.

State industry lavishly paid the best winter mountaineers to paint their belching factory smokestacks. Both the climbers and their clubs were subsidized as professional athletes, not unlike other Eastern-bloc athletes of the time. And they performed like pros.

“We were hungry back then,” said Wielicki, “hungry to write our own story.” To succeed, they had to do something that no one else had ever done. “No one had climbed the Himalaya in winter,” he said. “But Polish know cold. Cold makes us more creative. An Everest winter ascent in 1980 was a beginning, first chapter.”

In the winter of 1986, Wielicki and Jerzy Kukuczka climbed Kanchenjunga (28,208 feet). Among serious alpinists, Kukuczka is often considered the greatest high-altitude climber of all time. Described as a “psychological rhinoceros,” unequalled in his ability to suffer, Kukuczka was second to climb all fourteen 8,000-meter peaks, but he did ten of them by new routes and four in winter. In February 1987, Kukuczka and Artur Hajzer summited Annapurna (29,502 feet); and Wielicki soloed Lhotse on New Year’s Eve, 1988.

THE TEAM NEEDED TO SUMMIT BEFORE THE MIDDLE OF JANUARY—WHEN THE WINTER WINDS BECOME SO FEROCIOUS IT’S PRACTICALLY IMPOSSIBLE TO CONTINUE.

In a mere eight years the Poles had managed to knock off seven first winter ascents of 8,000-meter peaks. They were hailed as the Ice Warriors, a new breed of hard-core mountaineers.

“Then suddenly in 1989 everything collapsed,” said Artur Hajzer, one of the now white-bearded Ice Warriors. “Listen, I was one of the guys out there on the street marching. I was fighting for the fall of communism, but when the end came, so did our way of life.”

Which, Hajzer revealed, was even more picaresque than it appeared. Painting smokestacks subsidized Polish expeditions in the ’80s, but the money wasn’t enough to support the climbers’ families as well. So top Polish mountaineers became master smugglers. Purchasing cheap Polish products—down jackets, tents, mattresses, shoes—they hired trucks or even planes to transport them to Nepal, where they sold the items on the black market during expeditions.

“In the 1980s, the average income in Poland was ten, fifteen dollars a month,” said Hajzer. “Smuggling Polish products to Nepal, we made thousands. Climbers and climbing clubs had a huge income. Everybody wanted to be a climber!”

When the communist state finally disintegrated, so did the whole brilliant life Polish climbers had devised. “No money, no possibilities,” said Hajzer. No expeditions to the Himalaya.

Not another 8,000-meter peak was climbed in winter for 17 years (not until the winter ascent of Xixabangma in 2005, led by Jan Szulc). And no other nation or multinational mountaineering team stepped forward to fill the gap. Winter Himalayan climbing was a Polish thing.

It took more than a decade for Poland to find its economic feet. By then the knights of the Polish round table were grandfathers. Hajzer





Wielicki, at left, and Krzysztof Tarasewicz talk strategy in a tense Base Camp shortly before Christmas. As the worst of winter draws nearer, the window for success is closing.

TO SALVAGE THE EXPEDITION, WIELICKI MAKES A LAST-DITCH PLAN TO REACH THE SUMMIT, THOUGH THE HIGH CAMP IS NOT ESTABLISHED AND A BIVOUAC MEANS CERTAIN DEATH.

had founded a mountaineering equipment company. Wielicki had started an import business. The Iron Curtain was gone. Young Polish rock jocks could climb anywhere. They didn't have to suffer. They could go to Spain or Greece and climb in the sun.

And yet all the 8,000-meter peaks in Pakistan—K2, Broad Peak, Nanga Parbat, Gasherbrum I and II—and Makalu on the border between China and Nepal were still waiting for a winter ascent.

In 2002 Krzysztof Wielicki delivered a Winter Manifesto to the Polish Alpine Association. It was a call to action to the “young, angry, and ambitious”—the kind of appeal Lech Wałęsa, had he been a mountaineer, might have made. “There is a fad for easy and pleasant climbing,” he wrote. “It has to be fun. It has to be cool.” But Polish climbers had a more important mission. Half the 8,000-meter peaks had been climbed by Poles. Half were left. The time had come for a new generation to finish it. “You may count on my generation, on our help, our experience, even our active participation. The choice is yours!”

DECEMBER 18, 2006. The higher the team moves on the mountain, the more dangerous it becomes. Hajzer, Jawień, and Załuski spend three days fighting wind and cold to fix lines up a steep, long stretch of ice above Camp 1. They eventually put up more than 6,000 feet of rope, from 16,700 to 19,000 feet. It is a heroic push, and they return to Base Camp exhausted.

Wielicki and Robert Szymczak, the team doctor, are up next. Their mission: Extend the lines another thousand feet and put in Camp 2 at approximately 20,000 feet. On the 19th, above the fixed lines, they encounter a tower of rock on the snowy ridge, but instead of taking the time

to look for an easier way around it, Wielicki boldly leads a line straight up the middle. This is classic Wielicki: choosing the hard way. It is sketchy climbing on bad rock. He hammers in pitons occasionally, but mostly just solos up and up. The rock is so rotten Szymczak must hide behind outcrops to keep from being killed by stones tumbling in Wielicki's wake.

Dusk forces Wielicki and Szymczak to bivouac near the top of the tower at only 19,500 feet. It's 30°C below. They scrape out a shelf in the angled snow, survive a miserable night, and descend the next day badly fatigued.

The rest of the team is bewildered by Wielicki's choice of route. Although Camp 2 is eventually placed at 20,013 feet in a perilous crevasse directly above the “Wielicki spur,” the spur is too technical and too steep for the porters. They drop their loads at its base and scuttle back down the mountain. Wielicki, thinking like the elite climber he'd been during the '80s, not like the team leader he is now, has led his expedition into a vertical cul-de-sac. (“For me, it was like a test,” Wielicki will later say. “A challenge. A problem to overcome. It was necessary for me, for myself, not for the expedition.”) Humping tents, bags, rope, food, and fuel up the short Wielicki spur grinds the team down. Krzysztof Tarasewicz is hit by a falling stone that mangles a finger. Almost two weeks are wasted battling up and down this small stone tower.

Finally, on January 1, Hajzer, Jawień, and Załuski discover a simple detour around the Wielicki spur. But precious, irretrievable time, energy, and enthusiasm have been lost. Wielicki himself said that the team needed to summit before the middle of January—when winter winds become so ferocious it's impossible to continue.

His dark prediction begins to play out. Putting in Camp 3 becomes an epic struggle against the air raid of wind. Climbers are almost blown off the ridge. It takes another week and three attempts before the team finally establishes Camp 3 at 22,146 feet, chopping a small trench for a single tent in snow as hard as concrete.

Back at Base Camp there is a constant drone in the air: the deep-throated howl of the wind tearing at the summit. A sense of foreboding has descended upon the expedition. The slow progress, crippling cold, and withering stress have begun to unravel the indispensable braided rope of teamwork. Climbers have taken sides against one



DEFEAT On January 13, 2007, Jacek Berbeka waits dejectedly at Camp 1 for teammates to descend. The Poles played a dangerous game on Nanga Parbat and walked away with no loss of life or limb, a feat in itself. With six 8,000-meter peaks yet unclimbed in winter, they'll be back.

another; there's finger-pointing and murmuring.

In an attempt to salvage the expedition, Wielicki makes a last-ditch plan to reach the summit—even though Camp 4, the high camp, has not been established and a summit bivouac is certain death. Załuski and Jawień will push up to Camp 3; he and Hajzer will go to Camp 2, then follow. Szymczak and Łoziński will stand by at Base Camp. Maybe, somehow, Załuski and Jawień can still put in Camp 4. Maybe someone will somehow struggle to the top.

Załuski knows better. This will be his fifth trip up the mountain. He and Jawień are already spent, skeletons of the men they were a month ago. Trudging like weary soldiers out of Base Camp, up toward one last battle with the cold and wind, Załuski is fully aware of the senselessness of their mission. But he goes anyway.

Three days later, on January 14, the fifth Polish winter expedition to Nanga Parbat is over.

But not the story of Polish climbing.

Before the team is even back home, they are planning to return to the Himalaya. Hajzer and

Wielicki are thinking about Broad Peak. Jacek Berbeka wants to give Nanga Parbat another go. Załuski is hoping for K2, Tarasewicz for Makalu. Jawień, Szymczak, and Łoziński want to join Hajzer on Gasherbrum I or II. The old guard is scheming and dreaming with the young guns, just like in the old days.

In this story of mountains and men, winter and willpower, suffering and survival, eight chapters have already been written. There are only six left—and there's no doubt the Poles will write them. Who else could?

What if all 8,000-meter peaks could be conquered in the winter by Poles, Wielicki had declared in his Winter Manifesto. "Wouldn't it be great? Can you imagine that? Let the name Ice Warriors be inscribed in the history of Himalayan climbing forever."

It already is. □

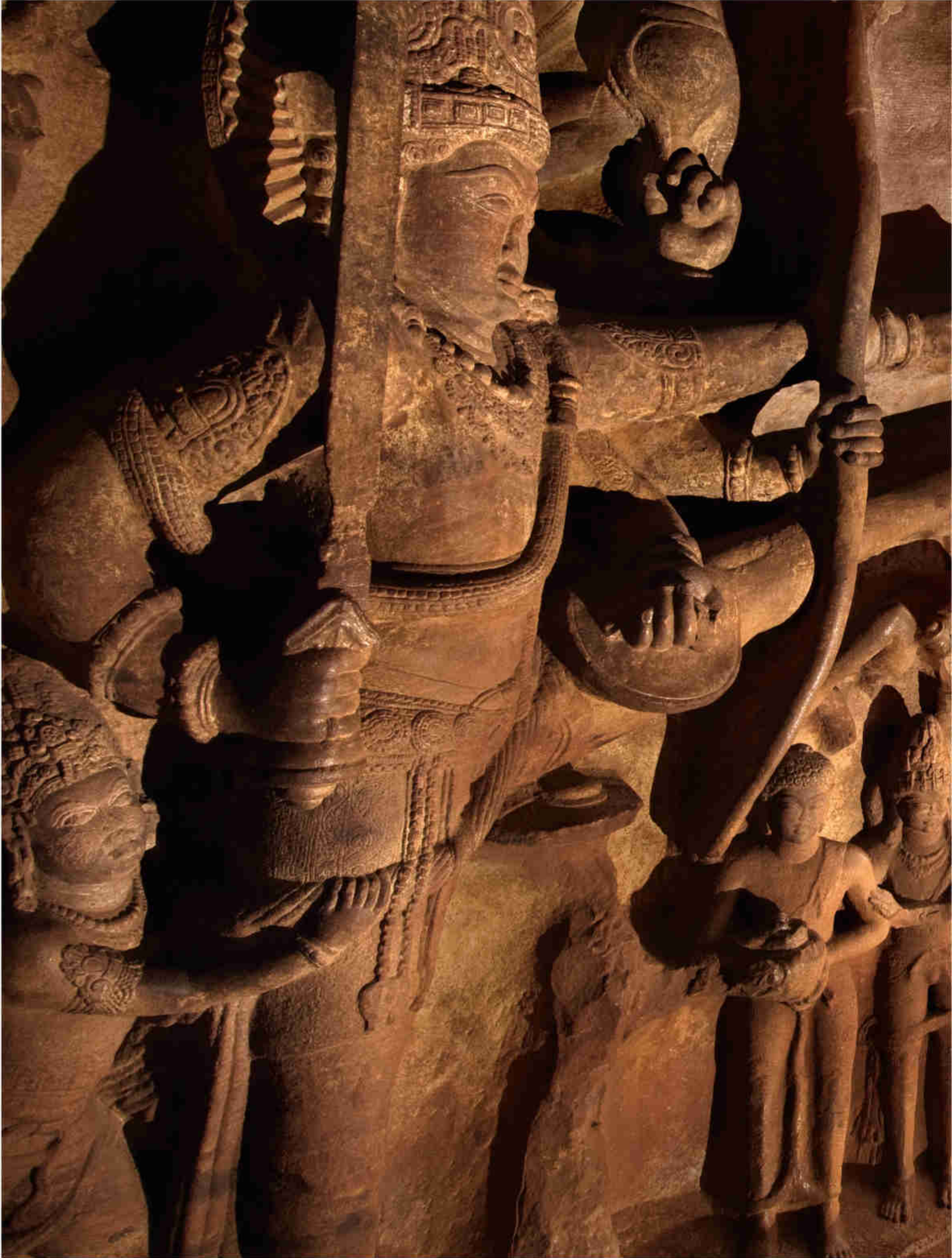
➤ **Killer Climb** What's it like tackling one of the world's toughest mountains? Watch an interview with photographer Tommy Heinrich at ngm.com.

Faces of the Divine

*In 1,500-year-old temples,
Indian artists portrayed their gods
as visions of perfection.*

■ *The enraptured gaze of Parvati, wife of the Hindu deity Shiva, glows from an eighth-century mural, one of the glories of India's sacred art. The painting graces Talagirishvara temple in Panamalai.*





■ To enter a cave temple in India was to step into a world where gods displayed their powers on hand-carved walls. In a sanctuary cut into sandstone bluffs at Badami, Vishnu strides



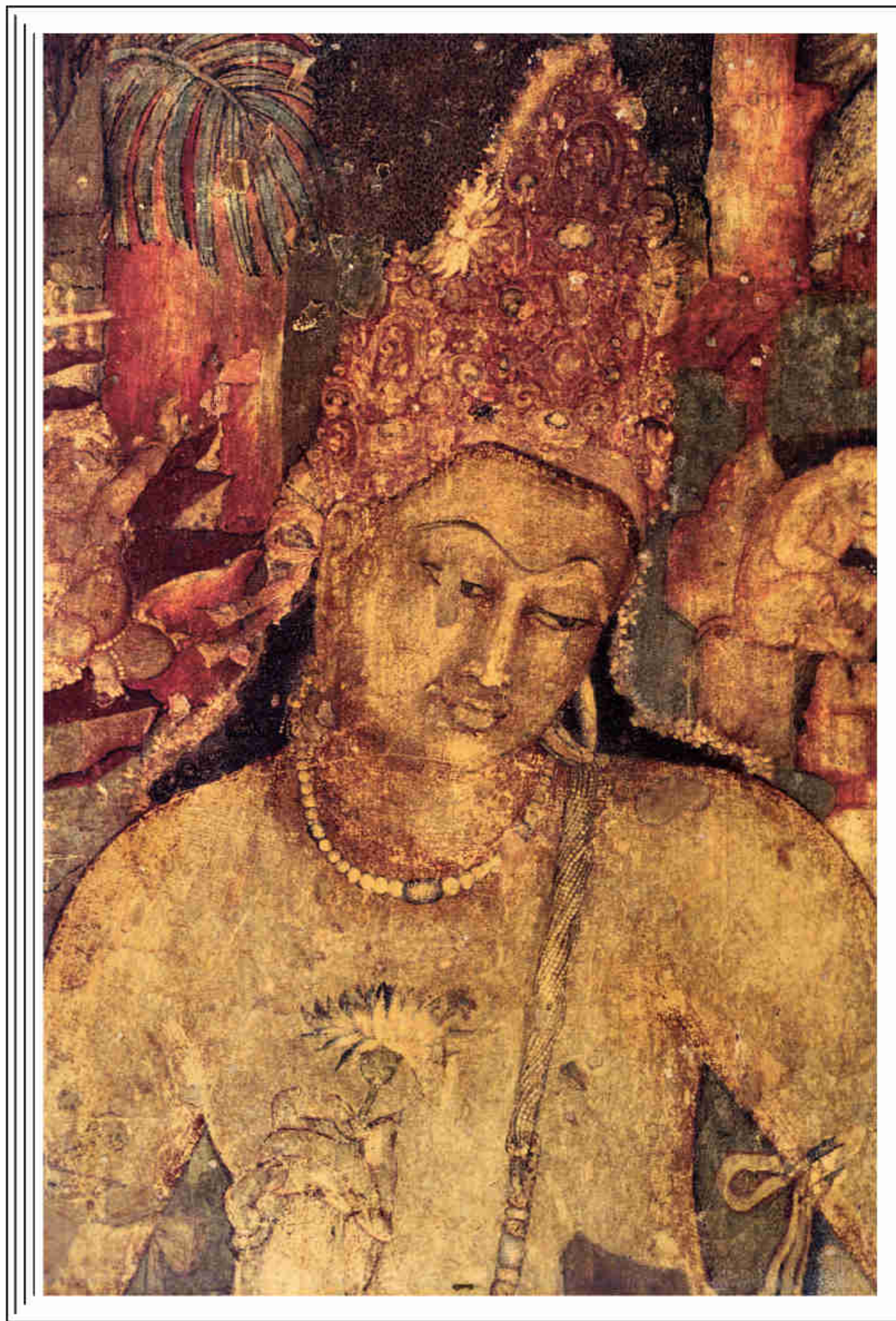
across the universe to vanquish a demon in a tale from Hindu myth. Such ornate rock-hewn temples proliferated across India in the sixth century to honor Hindu and Buddhist deities.



■ A vivid scene from one of the Buddha's past lives unfolds on a cave wall at Ajanta, a monastic site housing the richest sampling of early Indian painting. On this panel King Mahajanaka,



having renounced his worldly goods, takes a ritual bath before donning the robe of a monk. Ajanta's painters excelled at depicting small details, such as the king's wet locks.



■ *Portrait of tranquillity, Padmapani, the Bearer of the Lotus, gave the monks at Ajanta a vision of an ideal spiritual state. The ability to combine inner grace with outer beauty distinguishes the finest Indian art.*

By Tom O'Neill ■ Photographs by Benoy K. Behl

NATIONAL GEOGRAPHIC STAFF

Enchantment has many faces, but few compare with one painted 1,500 years ago on a cave wall in India.

To see it, the eyes must first adjust to darkness. Soon it becomes impossible to turn away. The figure is of a bare-chested man; he wears a tall crown and holds a delicate lotus flower in one hand. His torso is curved as if swaying to music only he hears. His face is tranquillity itself, eyes half-closed, lips pursed in a faint smile, his whole being absorbed in the sweetest dream possible.

This face has radiated serenity since the fifth century, when Buddhist monks inhabited a set of remarkable hand-cut cave temples built for them at Ajanta in central India. The name of the beatific figure is Bodhisattva Padmapani, a Buddhist deity who represents infinite compassion. Appearing near the entrance of one of the shrines, Padmapani stands as guardian, offering a vision of peace to all who enter. “The painting is a mirror,” whispered my guide, Indian photographer and filmmaker Benoy Behl. “It shows us the divine part of ourselves.”

To see it, Behl and I drove out of Aurangabad, a provincial city east of Mumbai. We passed fallow cotton fields, the soil black as ink; swerved around cattle, their bells tinkling, their



■ *Ajanta's painters outfitted an apsara, a celestial attendant, in royal finery, dressing her in jewels, a stylish turban, and a windblown scarf. The rich colors, supple shapes, and spiritual warmth of Ajanta's murals belong to a tradition that influenced temple art across India (map) and Southeast Asia for the next thousand years.*

horns painted in bright blues and reds; and, after an hour or so, pulled into an overlook above a gorge of the Waghora River.

More than two dozen man-made caves perforate the sweep of a dark basaltic rock face, their facades unexpectedly grand with pillars and statuary, reminiscent of the sculpted tombs and temples in the ancient city of Petra in Jordan. The lavishness of the Ajanta complex reflects its royal patronage; most of the cave temples were carved during the reign of a king named Harishena, who ruled a large swath of central India in the mid-fifth century A.D. Several hundred monks lived in the Ajanta caves.

In the rainy season, from June to September, the gorge they overlook turns green with vegetation and waterfalls spill down the steep walls. During the driest months, the sun beats down fiercely and the riverbed is dust. The cool interior of the caves feels like a prayer answered.

Inside most of the caves, designed as prayer halls (*chaityas*) and living quarters (*viharas*), a central chamber lined with columns opens into a shrine where a statue of the Buddha still waits. Along the outer corridors, doorways open to monks' cells, bare except for stone beds. The architectural mood is solemn, reverential—until you look at the walls.

With a glance, you step into an otherworldly vision. The most elaborate of Ajanta's 30 caves were designed for enlightenment, many of their walls covered with inspirational paintings like the one of Padmapani. Only fragments of the

once elaborate murals have survived the centuries, yet enough remain to summon the sensual and spiritual atmosphere that infused these temples. All of known creation surely paraded across these walls. There are images of the Buddha and of bodhisattvas—other enlightened beings. There are princes and princesses, merchants, beggars, musicians, servants, lovers, soldiers, and holy men. Elephants, monkeys, buffalo, geese, horses, and even ants join the human throng. Trees bloom, lotus blossoms open, vines curl and reach.

Most of the figures inhabit crowded, intricately composed murals that tell stories, called *jatakas*, from the many past lives of the Buddha. Others depict incidents from the life of the historical Buddha, an Indian prince who lived a thousand years earlier. The paintings serve as illustrated classics, fifth-century style, meant to awaken devotion and heighten spiritual awareness through the act of seeing. For most visitors today, the tales are arcane. Yet the sensation of watching the images emerge from the dark in all their grace and beauty links then and now. A vision of paradise never grows old.

FEW VISITORS HAVE BEEN AFFECTED more powerfully than Benoy Behl. When he first visited the cliffside caves in 1991, he posed himself a challenge. Was it possible to photograph the cave murals using only available light? By then Ajanta had gained international fame as a UNESCO World Heritage site, but decades earlier, misguided conservators had applied shellac to the murals, distorting their colors. More recent efforts to clean the surfaces have improved their condition. Even so, when seen or photographed

Photographer and filmmaker Benoy K. Behl has captured the art and architecture of hundreds of temples and other monuments in India, Nepal, and China.

*The sensation of watching images emerge from the dark
and then responding to their grace and beauty
links then and now. A vision of paradise never grows old.*



India's art was both mirror and window, offering views to a higher consciousness. Those who truly saw became seers, the gurus who smiled like a bodhisattva.

with artificial lights, the colors and scenes often appeared flat, drained of vitality.

Behl had already succeeded in creating night-time images of the Portuguese-era cathedrals in Goa, on India's west coast, with only moonlight for illumination. He set out to try a similar technique at Ajanta, using the dim natural light in the caves to dispel the darkness. For two years Behl photographed every human, animal, plant, and deity on the walls and ceilings, in close-up or as parts of larger compositions. Working with a tripod, often standing on a simple wooden table, he would leave his shutter open for minutes at a time. The results were a revelation.

When the director of the Archaeological Survey of India saw Behl's images, he exclaimed, "You have really conquered the darkness." Art historians reacted as if they were seeing a great work of art for the first time. Behl proceeded to publish a book of his Ajanta photographs and exhibit them around the world. He also undertook an ongoing series of films on Indian painting and sculpture, making high-quality photographs of other premodern paintings, including ones from the remote Buddhist monastery at Alchi in the Himalaya and the monumental Brihadishvara temple in Thanjavur in southern India, a Hindu site.

Behl's work has helped scholars see early Indian art in a fresh light, as part of a more extensive and continuous tradition. The Ajanta paintings were once viewed, Behl says, as a "flash in a pan," an isolated, extraordinary achievement. His photographs and films make it clear that the splendors of Ajanta emerged from earlier trends, and their influence spread far and wide. "Because of Benoy's photographs,"

says Joan Cummins, curator of Asian Art at the Brooklyn Museum, "we no longer see the art of Ajanta as a solitary island; now we see it as part of a long archipelago."

Developments in sacred imagery fed the artistic blossoming at Ajanta. This was the era when the figure of the Buddha achieved an idealized, perfected human form. At first, artists had relied on symbols—footprints, a tree, an empty throne—to represent the historical Buddha. But followers wanted a more personal focus for their devotion. The likeness invented on the Indian subcontinent in the first centuries A.D., with lowered eyes and serene expression, would become the prototype for Buddhist images across Asia. It remains the indelible face of the Buddha today.

Around the same time that Ajanta reached its full glory, freestanding stone temples proliferated to honor the principal Hindu deities of Shiva and Vishnu, depicted as powerful, multi-armed beings. Buddhist and Hindu sites alike overflowed with images whose fluent form and expressive character have rarely been matched, releasing a new fervor in worshippers.

That this flowering took place simultaneously within both religions is not surprising. The essential tenets of Buddhism and Hinduism arose from similar ideas, best described in the Upanishads, a set of Hindu treatises set down in India largely between the eighth and fourth centuries B.C. These sacred texts envisioned the human self as one with the divine essence, "the real behind the real"—an abstract life force called *Brahman*. The flow between faiths was such that for hundreds of years, almost all Buddhist temples, including the ones at Ajanta, were built

■ *Of the parables painted on Ajanta's walls, one of the most engaging involves a monkey and the Buddha, born as a buffalo in a previous life. On this fragment, the Buddha-to-be tolerates the monkey's antics. The monkey then sported with an unenlightened buffalo and was trampled to death.*



under the rule and patronage of Hindu kings.

A profound aesthetic belief also united the two religions. Beauty meant nothing in itself: A work of art, whether a bronze statue of Shiva engaged in his cosmic dance of creating and destroying the universe or a painting of the Buddha attaining enlightenment under the bodhi tree, amounted to no more than base metal or dried pigment until a viewer responded to it. Seeing a painting or sculpture in a temple opened the minds of receptive worshippers to intimate communion with the divine. Seeing was believing.

Hindus call this intense participatory relationship with art an act of *darshan*, or “seeing” the deity. “Such seeing does not literally mean merely using one’s eyes,” according to art historian Vidya Dehejia, “but is a dynamic act of awareness.” For the Buddhist monks and their patrons at the Ajanta monastery, paintings of the Buddha served the same potent function, providing a key to revelation.

WHEN I VISITED THE AJANTA CAVES with Behl, I was surprised at how murky the murals appeared without the advantage of his long, light-soaking exposures. But Behl in his soothing voice began picking out details—a dancer circled by musicians, a princess in love playing on a swing, a pair of antelope listening to the sermon of an ascetic, the future Buddha riding a horse past weeping women as he renounces the life of material riches. “Look at the warmth of expressions on those palace maidens; they are so full of love,” Behl murmured. “Is the swell of that belly not beautiful?”

These effects flow in part from technical

skill—sophisticated shading and highlighting, multiple perspectives (some figures seen at eye level, others from above or below), long expressive brushstrokes. The anonymous painters would have been members of an artisans’ guild, as adept at painting Hindu deities as Buddhist bodhisattvas. They may have followed rules laid down in one of the oldest known treatises on painting, a Sanskrit text called the *Chitrastotra*.

A collection of oral traditions likely dating from well before Ajanta, the *Chitrastotra* (“discourse on painting”) contains thousands of tips, from how to paint a lotus with exactly 52 petals to how an artist should wash and dress. It also specifies an ideal look for deities, supporting characters, and nature scenes. Yet the Ajanta painters infused the work with their own individual geniuses, evident in the grace and expressiveness of many of the figures.

At the death of King Harishena in 477, cave excavation abruptly stopped, the monastery began to empty, and Ajanta’s brilliant paintings fell into obscurity. By the end of the 13th century Buddhism had largely disappeared from India, its holy places either destroyed or abandoned in the wake of invasions from Muslim armies. Only bats and local tribes knew of Ajanta in 1819 when a group of British soldiers, probably on a tiger hunt, stumbled upon the caves and their mysterious murals. Since then the world has rediscovered the sublime power of the paintings, no one more than Behl. “I swooned over the emotions in those faces,” he says. “I saw in them a world of gentleness.”

➤ **Divine Discoveries** Explore more of India’s sacred art through our interactive map at ngm.com.



■ Under a full moon, devotees of Shiva gather in the courtyard of the Brihadishvara temple in Thanjavur, completed in 1010 as the first monumental stone temple in India. The Hindu



faithful come to glimpse the deities depicted inside. Buddhist and Hindu art both began to flourish in the fifth century as painters and sculptors perfected human images of the divine.



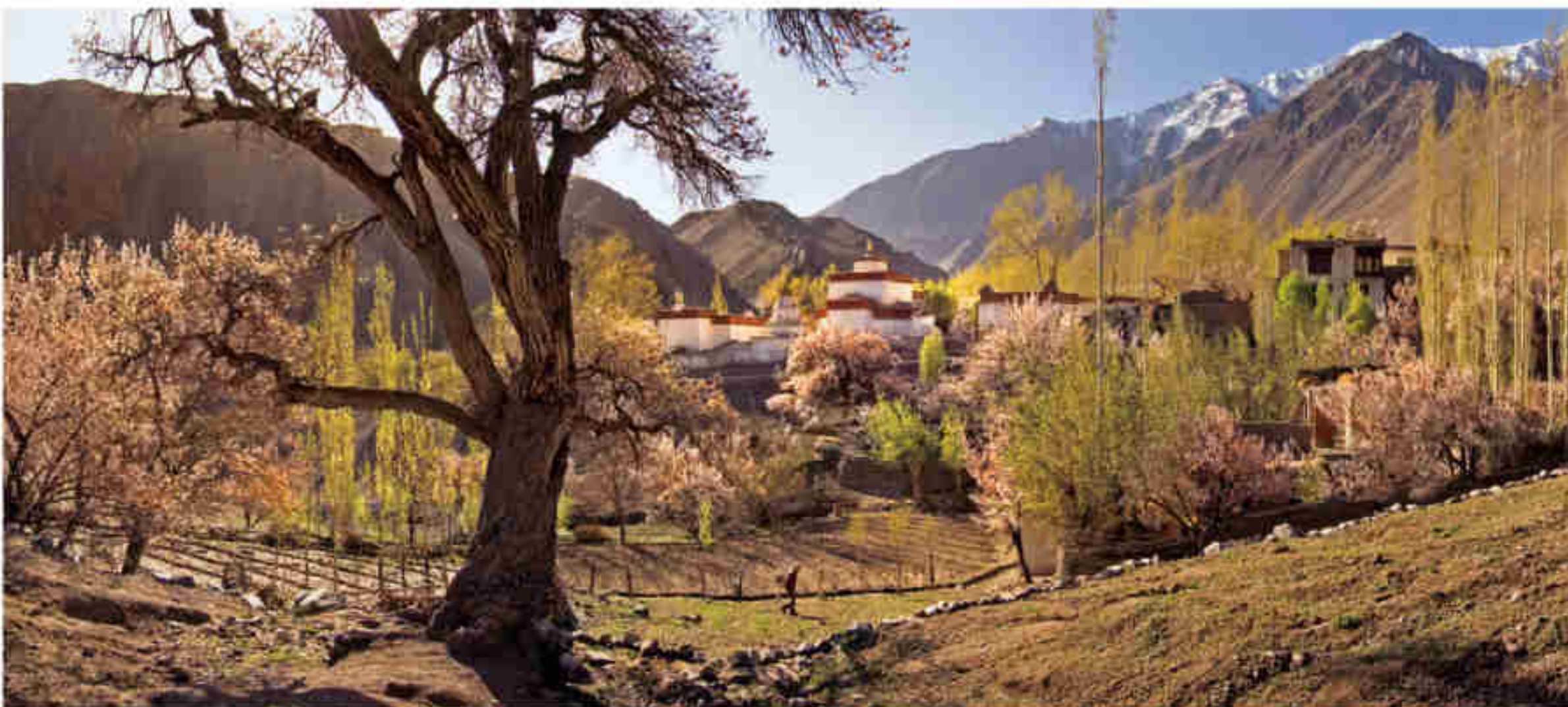
■ Joyous dancers greet the Hindu saint Sundara as he journeys to Shiva's holy mountain in one of the devotional scenes painted on the inner sanctum walls of the Brihadishvara temple.



The 11th-century murals—the greatest Shiva-themed paintings—were rediscovered in the 1930s after a covering of later artwork began to flake off.



■ *Physical perfection helped define the deities and made them approachable in the eyes of Indian artists and worshippers. Painted in the 11th or 12th century, the six-armed Green Tara (above), a female Buddhist deity associated with wisdom, appears on a wall of Sumtsek temple in the Himalayan village of Alchi (below). This ancient painting tradition of giving luminous shape to the divine would continue at least into the 16th century. One of its final masterpieces, the flute-playing Krishna (right), a popular Hindu divinity, adorns a mural at Mattancherry Palace in Cochin, Kerala, showing a face worthy of love. □*





In the early 20th century,
railroads lured settlers
into North Dakota with
promises of homesteads.
Towns were planted
everywhere. Houses rose
from the sweep of the
plains, many, like this one,
with a story no one can
trace. People believed rain
would follow the plow.
But they were wrong.

BY CHARLES BOWDEN

PHOTOGRAPHS

BY EUGENE RICHARDS



the emptied prairie



Preceding pages:

EPPING, N.D.

Dan Stomley, 55, grew up nearby, but he knows nothing of the house sitting lonely on a knoll. A local woman in her 90s would have known. But about a year ago her mind started fading. Stomley wanted to buy the place 30 years ago, but he's not sure the owners wouldn't sell. "Might have been their family place," he says.

Stomley's grandfather's house farther north is tumbling also, on 240 acres he worked with horses. He had 20 cows and took the cream into Crosby, North Dakota, once a week.

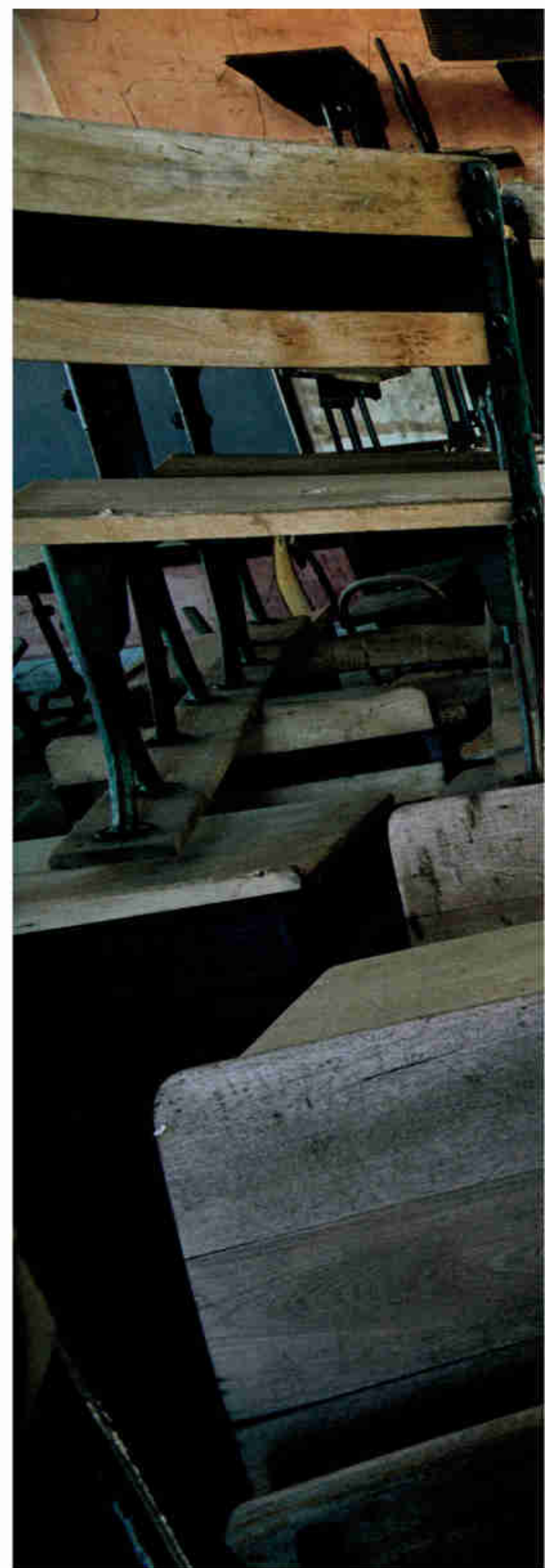
Stomley comes back home once a month from the oil fields of Colorado. "My house," he says of his current home in Epping, "was ordered from Montgomery Ward in 1928. The garage used to be a bank. The town was about 200 people in its time. Now we're about 80, not counting cats and dogs."

GASCOYNE, N.D.

The last high school class in Gascoyne, North Dakota, graduated in 1940. When Vernon Peterson entered the elementary grades, he formed one-half of a class of two. Now the land almost swallows up the sagging old schoolhouse, its shingles peeling off the roof. The town, founded in 1907, is down to 13 souls. In the early 1960s, local kids started taking classes in nearby Scranton.

Peterson and his wife, Marlene, raised four sons, but they have gone off to find livings. He stands outside under the endless sky and says, "That was the grocery and post office, that was the hardware store, there was the ice-cream parlor. Now the football team is gone from the school in Scranton. We may lose basketball. We graduated 15 last year, but we only have seven in kindergarten."

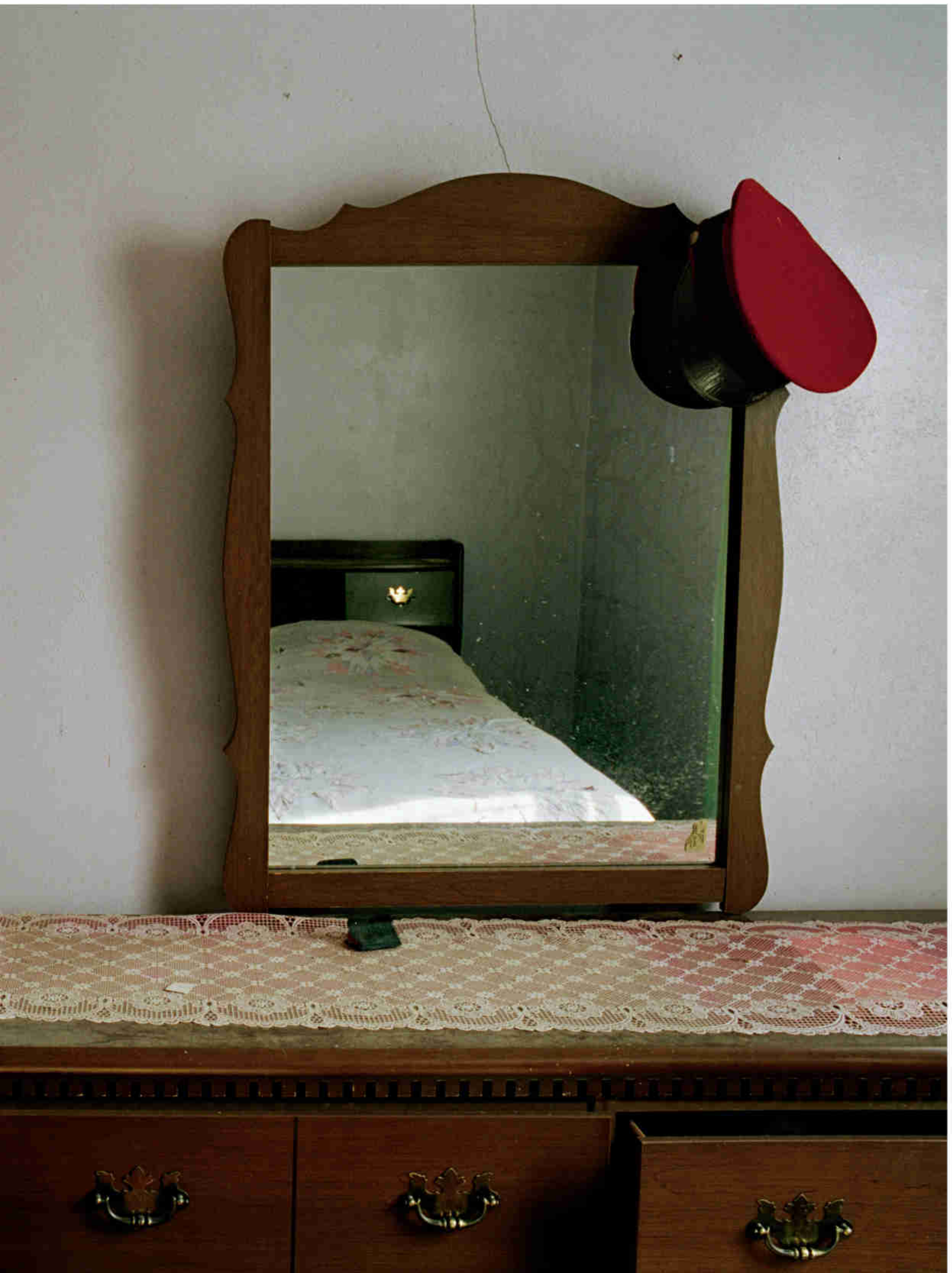
A torn page from a textbook flutters in the breeze from a broken window in the Gascoyne school. The lesson reads: "Write the Other Word for CRY, AFTER, BAD, ALWAYS, GOOD-BY, LOST, and DARK."







MOTT, N.D. The floors of this house are strewn with the detritus of lives let go, ankle-deep with



abandoned possessions. Except in this room, left orderly and arranged with care like a museum of a vanished loved one. The red hat is part of the uniform for the town's marching band.

The robin's-egg blue kitchen looks out on the brown grass of the empty plains. The gas stove lurches away from the wall, and, in the wild yard, the white bones of a deer bleach in the sun. Plaster fragments litter the floors of the rooms, and down in the cellar a galvanized wringer washer stands watch by the long-dead coal furnace. In the upstairs bedroom, a window sash has slipped and become a trapezoid framing the abandoned orchard to the west. Two old cars rust nearby, caressed by the moan of the wind. The stone footing of a vanished barn stares east at wheat and grass. Ghost towns stud North Dakota, and this empty house is just one bone in a giant skeleton of abandoned human desire.

This is the place where American assumptions about the land proved to be wrong. The homesteaders believed rain followed the plow. In the grasslands of western Kansas, Nebraska, and the Dakotas, they learned better. And so for almost a century we've watched stranded towns and houses fall one by one like autumn leaves in the chill of October. In most of the United States, abandoned buildings are a sign of change and shifting economic opportunities. On the High Plains, they always mean that something in the earth and the sky mutinied against the settlers.

Successive human waves have been bested on the High Plains of North Dakota. Indians on horseback lived a dream of motion and buffalo for more than a century before the U.S. military and hide hunters destroyed their world. For several decades in the early 19th century, trading posts thrived off fur-bearing animals until both the beasts and the traders were also gone. For

three years in the 1880s, a cattle kingdom rushed into the cemetery of the bison until blizzards and drought snapped everyone back to reality.

Then, around the turn of the 20th century, the railroads lured settlers, largely Norwegians and Germans, into the void with promises of homesteads. Towns were planted everywhere—what one state historian calls the Too Much Mistake—in this isolated, semiarid region until, starting with the Depression and the dust storms of the 1930s, the farms faltered, then failed. The state now holds dozens of abandoned towns. Today in western North Dakota a 3,000-acre spread of wheat is necessary for survival, and so the ground is littered with dead towns and empty kitchens where people once painted the walls a cheery robin's-egg blue.

Greg Bjella, in his 50s, has no memory of who once lived in the house with the blue kitchen, but then there is almost a willful amnesia in



BELFIELD, N.D. On the highways that dissect North Dakota, horizon always beckons.

North Dakota. He lives just down the road on land his grandfather homesteaded. Epping, with about 75 people, has been home to the family ironworks since 1906, a business Bjella still runs during the warmer months of the year.

“We’ve even had a baby born to a family in Epping,” he says, “which I’m sure has not happened in 20 years.” Ten years ago, a strong wind ripped the front off the ironworks, and Bjella has rebuilt it in stout fashion because, he explains, “when I’m gone, it will have to stand on its own.”

That’s the rub in rural North Dakota, a sense of things ebbing, of churches being abandoned, schools shutting down, towns becoming ruins. And all this decline exists amid a seeming statistical prosperity: Oil is booming, wheat prices are at record highs, and, as the average farm size grows, the land is studded with paper millionaires living in the lonely sweep of the plains, with surrounding community gone to the wind.

North Dakota is among the windiest states in the Union and one of the coldest south of Alaska. Twice the legislature has considered changing the name to simply Dakota to shake the chill from its image. The state’s population has stabilized at around 600,000 thanks mainly to the growth around its cities—Fargo, Grand Forks, Mandan, and Bismarck. But out on the land, the population has relentlessly bled away. So there is money and prosperity and the numbing sense that comes from living in a vanishing world.

Across the field from Bjella’s place, a couple of miles from Epping, is a concrete house with yellow walls. He says an old bachelor lived there, and then one day his home burned, and he rebuilt with concrete so it would be fireproof. The roof is largely gone, and the two rooms—14 feet by 20—are stripped of furniture and littered with fallen plaster. Wind pours through



the windows. On the floor of one room is a rotting phone book and a coverless copy of *The Book of Knowledge* with the proud boast: “Answers Every Question a Child Can Ask.”

Bjella explains the man walked the tracks each day for the two miles into town, did this year after year. One day he apparently did not hear the train and was killed. Bjella pauses, lets the tale float almost weightlessly in the air with its whisper of suicide. Self-destruction is not a forbidden subject in North Dakota, and people easily tick off cases in their neighborhoods. One woman came across a death book compiled in the early decades of the 20th century. She says the records show a remarkable number of people killed by trains.

The ground itself reeks of life, the endless sweep of grassland and wheat fields, cattle feeding in place of buffalo. South of the Missouri River, the Badlands stab the eye with bands of color rippling through the eroded slopes. North Dakota is a rarely visited state and surely one of the loveliest and most moving. The land swallows anyone who walks out into it. Everything begins as a promise. A young Teddy Roosevelt on a buffalo-killing holiday from New York in 1883 decided after a few days he would become rich as a cattleman and handed a \$14,000 check to two men he barely knew so they could begin his great and doomed enterprise. The Marquis de Mores, a Frenchman with family wealth and a title, in that same year plotted a meatpacking and cattle empire and also lost his shirt, but left a town, Medora, and a château on the hill.

Slope County just to the south has a little over 700 people and a county seat of 24, Amidon.

Charles Bowden is a Tucson-based author who writes frequently about human migration. Eugene Richards is an award-winning photojournalist who journeyed across the High Plains to document the “transient nature of things.”

“THINGS HAPPEN SO SLOWLY, YOU REALLY DON’T

The only other town, Marmarth, was once a railroad head of 1,300 and now has 126 souls. Patti Perry, the economic development officer of the community, has lived here all her life and is third generation. She sits in the town’s bar and café and tries to explain. “The hardest part of living in a declining town,” she offers, “is trying to figure out how to stop it. Things happen so slowly, you really don’t notice at first—five leave one year, then six the next—and you wake up one day and wonder what happened here.”

What happens is that some people cash in on their property and move someplace warmer and easier. The rest grow old and die. There are constant funerals: One guy leaving the bar stops by and Perry asks him if he is going to a service, and he says, “No, I’m all funeraled up this week.” Church attendance dwindles, congregations become mixtures of various denominations, and when those numbers fall too far, the doors shut. Sometimes a congregation decides to burn the building to end the pain.

Tom Rafferty, 59, is the third generation of his people to live in Havelock, and now he has the run of the town. He and his wife are the last residents. The place once had about 250 people, a lumberyard, stockyard, railroad, two banks, three grain elevators, a grocery store with a pool table and liberal hours on serving liquor, and his grandfather’s general store. It was surrounded by seven coal mines. He’s looked through his granddad’s diary from 1908 and notes, “a lot of the entries are about wind.”

“There were a lot of suicides,” he says. “I think in many cases it was financial—they were down and out—and in other cases, it was the loneliness.”

You crawl down into a cellar in another town, walk past a dead badger, then climb the sagging stairs to the debris of an abandoned life. On the floor is a handmade book, its buckram cover with the crayoned title, “MY SHOWER,” and dated Saturday, June 9, 1951. It is illustrated with images cut from magazines, and the first one is of a young woman, lips red, hair blond, and written in a clear hand in ink, “The Bride.” Now it is

NOTICE AT FIRST, AND YOU WAKE UP ONE DAY AND WONDER WHAT HAPPENED HERE.”

—Patti Perry, Slope County economic development officer

refuse along with children's toys and other things left behind. Or you enter another house where clothes hang in the closets and a dead cat shares the floor with a funeral book, *Abiding Faith*, that lists those in attendance and what floral arrangements they gave. The wind blows and outside two figures dance across a field, creatures that look like wolves through binoculars but could be dogs. Moose have also returned, along with the mountain lion. North Dakota has a feral edge to it.

Melvin Wisdahl is just shy of 83 and lives with his wife, Morrene, in Corinth, a town of six. When he was a boy, it was a town of about 75. He's spent his life with wheat and work and politics—a supporter of the prairie populist group called the Nonpartisan League, which influenced the state for decades. He's a solid man in his flannel shirt and torn jeans, with hands that show a lifetime of labor. His two sons now work 5,000 acres of wheat, canola, and other crops, plus cattle on the side, but Melvin figures that after them, with ever larger operations needed to make a living, well, it will all go to pieces.

“It was economics and drought,” he says softly, “drove everybody out. The drought of the late '30s, then the war—everyone left for the defense industries. I'm 82 and never left and never wanted to leave.”

He contents himself with growing white burley tobacco in his garden, though he has never smoked, and fiddling with two stills, though he does not drink. And reading—sometimes he climbs a knoll by the house so the cell phone will work and calls the *Progressive Populist* magazine down in Texas to give them a piece of his mind. He's also been a board member of a bank. He is the survivor.

“You can imagine,” he says, “some of the trauma the first people went through here. I remember my mother telling me she never got used to the wind because in her valley in Norway there was no wind.”

Morrene Wisdahl recalls how the well on her people's place was hundreds of yards from the homestead, and the water froze in winter. She tells of how in summer that well was circled by

wild mint and yellow buttercups, smiling at the memory, and suddenly the beckoning of the land to its first settlers fills the room.

Melvin explains the drive behind settlement by recalling what his uncle told him of Norway: “They starved us out.”

“I saw Corinth in its heyday,” he reports, “and I saw its dissolution. Blacksmith, two groceries, lumberyard, pool hall, hotel, hardware, bank, International Harvester dealer, dance hall—the biggest one in all of the local towns—all the toughs would come and fight all night.”

The town and Melvin and Morrene are bedrock America, but here the rock is shattering. He and his brothers and his late friend Oscar all served in World War II. Every winter he'd go by Oscar's and say, “Well, do you remember how you were years ago at this time?” and Oscar would always answer, “Cold.”

He stops, pinches his nose, and all but weeps, and says, “I'm sorry.”

Then he continues, “I saw boys in a fetal position. They were afraid to move. And they wet themselves and soiled themselves.”

In the neighboring house, an infantry uniform hangs in the closet, the campaign cap perfectly folded on the shoulder. Sometimes in winter, snow drifts in.

Something is ending here that no one ever saw coming. There is nothing to be done: It is simply the acting out of an economic reality.

It is hard to watch. Yet it is impossible to look away.

In Alkabo, the two-story public school still stands, fully equipped with trophies, musical instruments, and books. The students have long gone. The neighboring baseball field is named Field of Dreams.

Just south is Writing Rock, where two stones bear prehistoric drawings. The native people said the rocks could tell the future, but then scholars took one stone away for some years. Since that time the stones have been mute.

➤ **Desolate Dakota** View more of Eugene Richards's haunting images at ngm.com.



CHARBONNEAU, N.D. Cars are left behind when they can no longer help you leave. A grain elevator waits



by the bottomland, the farmers long gone. The nearby house that Elsie Carsten's father built has caved into the cellar. "It doesn't make me sad to see it all going back to the earth. That's the way life is," she says.



WALUM, N.D.

As walls tumble, boundaries fray and the line between house and barnyard melts away. The horses living near this white house south of Walum appear neglected, lonely on the plain.



MOTT, N.D.

“That place has been empty for years,” says Gilmer Anderson, 87, who farms a few miles to the north. He stops his tractor and says, “Rufus Svihovec, Bohemian, you know. He was an awful heavy drinker, married once, the wife died. He went to the old-folks home in Mott, and he died there.” And then Anderson fires up his tractor and gets back to spreading hay for his cows.

Rufus had one foot mangled in a mower as a child and so lived his life disabled. To Ervin Schneider, he was Uncle Rufus, a hired hand who worked his father’s farm when he was a boy. Schneider would wear new shoes for Rufus, to soften them for his foot. Once, just before Schneider went to high school, Uncle Rufus shared some wine with him, and the next thing Schneider remembered were the cows stepping over him as they entered the barn for milking.

“Look at this,” says Schneider, and he picks up an old photograph from the 1950s, Rufus leaning over the wheel of his car with a grin, his wife, Anna, in the passenger seat. “When I was ten,” he says, “I saw Uncle Rufus lift the engine from a Model A with his bare hands. Rufus and Anna had a tough life. Everyone did then.”



HANKS, N.D. Debra Quarne is 53, has 56 horses, and is the last resident of Hanks. Once there were 200.



Down the road from her home is a failed bank—a man hanged himself in the basement there during the dust and ruin of the 1930s. “I love it here,” she says. “It’s my own little corner of the world.”



POWERS LAKE, N.D.

The dust clouds one blue eye as the severed doll's head stares up in the garage. Nearby is a walker for an infant, a red plastic telephone, and two more dolls, one with limbs severed. There is a small newspaper clipping noting the birth of Jolene Melissa, the first child, on October 6, 1982. Also, the sale of a Holstein for \$250 in 1974. They are fragments of dreams in a garage

near a small white frame house with a neighboring red barn in the sweep of the plains. Plus, a small rubber Santa Claus waiting for Christmas.

Many abandoned houses have dolls with blond hair and blue eyes.



GRENORA, N.D.

“I’m the oldest man in town,” says Ragnar Slaaen, 96. “That house used to belong to some people from Montana, been empty at least 50 years. They farmed a little bit. What happened to them? I suppose they got old and croaked.

“I was born in 1911, twelve miles north of town on a homestead. My father came from Norway. He died when I was two. I can’t imagine where my mother found the food. I went eight grades to a country

school. Nobody went to high school—we had to work. I worked for a neighbor at age eight picking up rocks all day.

“I got my own farm in ’36. I plowed with horses. We didn’t have any rain at all. With the dusters, it was so dark you couldn’t see anything inside the house. Everything just blew

away. You had to get used to breathing dirt.

“Our first baby was a girl, stillborn. Do you know what stillborn means? We had two boys.

“I’ve had a good life, a lovely wife. She died seven years ago. I’ve still got my hair. You know I sit here alone for six months at a time, nobody comes to see me. I’ve outlived them all. I’m the oldest man in town.” □



Sometimes an old cell phone is beyond repair. But those in working condition can still be put to good use.

HIGH-TECH TRASH, PAGE 64 **E-cycling Etiquette**

Americans toss out about two million tons of unwanted electronics annually, fouling landfills with toxic lead from old computer monitors, cadmium from leaking batteries, and more. But it's getting easier to discard responsibly. Some charities repurpose old cell phones as lifelines for seniors and victims of domestic violence, and computers can go to underfunded schools. Reputable recyclers will properly scrap unusable electronics, though they sometimes charge a small fee. Donating newer models, on the other hand, can earn a tax deduction, so keeping old gadgets from gathering dust helps you and the environment. For more information on charities and recyclers, go to epa.gov/ecycling.

■ **Cell phones** Find donation bins at electronics stores and libraries. Wireless carriers also accept used phones. For options visit recyclewirelessphones.com.

■ **Computers** Most makers accept their brand from customers buying new ones. Some office supply store chains accept old computers for a fee. The National Cristina Foundation connects computer donors with the needy. Go to cristina.org.

■ **Batteries** Often retail stores selling rechargeable batteries will accept used ones, including small sealed lead-acid batteries from power backups. See call2recycle.org for locations.

■ **Printer supplies** Spent toner cartridges are valuable; trade them in for discounts or refill them at retail stores. Collecting used ones for recycling can even be a profitable fund-raiser for groups.

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An abandoned truck frames a shot for Eugene Richards in Hanks, North Dakota.

ON ASSIGNMENT Dakota Days The only thing scary about the ghost town houses of North Dakota, says Eugene Richards, is the prospect of falling through a rotted floor. “That happened a few times,” the photographer admits. “You just hope you don’t fall all the way to the basement.” The abandoned homes, some empty for decades, had “the quality of a cemetery,” Richards says. “You know that something has befallen the people who lived there. They wouldn’t leave if they could have stayed. Was there a death? A divorce? Or was it just weariness of the hard life there? There’s no way to know. We found a beautiful wedding dress in one of the houses. It had probably been hanging there for 12 years.”

In 2007 Richards received the first annual *National Geographic* Grant for Photography. He is using the \$50,000 award to work on a long-term project titled “War Is Personal,” a series of photographic and written essays about people—in and out of the military—whose lives have been changed by the war in Iraq.



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John Stanmeyer cuts across a rice field to shoot a ceremony on Mount Agung in Bali.

ON ASSIGNMENT Close to Home He's not just a visitor to Indonesia's volcano culture—photographer John Stanmeyer lives with it every day. "I live on a small island that has two active volcanoes. Following Balinese traditions, nearly everyone on the island sleeps with his head pointing toward sacred Mount Agung." He's just as much in thrall of volcanoes as anyone born Balinese. "Volcanoes' overwhelming scale and power remind me how insignificant I am, and how astonishing the world is."



Mark Jenkins shakes out ice at Nanga Parbat. Night temperatures dipped to minus 25°F; his breath condensed and froze on his tent's walls.

ON ASSIGNMENT Aiming High

Mark Jenkins knows his mountains. The writer of this issue's story on the ascent of Nanga Parbat in Pakistan grew up in Wyoming, where he first climbed Devils Tower in 1975. He has since taken on more than 20 mountaineering expeditions around the world, traveling to Everest, Denali, and Argentina's Aconcagua. The *National Geographic* contributing writer's latest book, *A Man's Life: Dispatches From Dangerous Places*, was published in October 2007.

If You Purchased a Gem Diamond or Diamond Jewelry Between January 1, 1994 and March 31, 2006

You May Have a Claim to Receive Benefits in a Proposed Class Action Settlement

You may be eligible to obtain a cash benefit from a Proposed Class Action Settlement of litigation pending in the United States District Court for the District of New Jersey. The case is called *Sullivan v. DB Investments, Inc.*, Civil Action Index No. 04-2819 (SRC). These lawsuits are about gem diamond pricing, and the Proposed Settlement is with De Beers, a miner and seller of rough gem diamonds.

This is just a summary of your rights. To get complete information about the Class Actions and your rights, and to see if you qualify to receive a cash payment, you should visit: www.diamondsclassaction.com or call: 1-800-760-5431.

What Are These Lawsuits About?

The lawsuits allege that the De Beers group of companies ("Defendants") conspired to fix, raise and control the price of gem diamonds. They also claim that De Beers monopolized the rough gem diamond market and issued false and misleading advertising. The lawsuits claim that Class Members therefore were forced to pay more for gem diamonds and diamond products.

The Defendants deny these allegations, and have decided to settle, without admitting any liability or wrongdoing, to avoid the expense and burden of litigation.

Who is Involved?

There are two groups of people whose rights are affected by the Proposed Class Action Settlement. These two groups are the "Direct Purchaser Class" and the "Indirect Purchaser Class."

You are a member of the "Direct Purchaser Class" if:

- You are a person or business resident in the United States, excluding De Beers shareholders, and
- Between September 20, 1997 and March 31, 2006, you purchased any gem diamond directly from De Beers or one of De Beers's diamond mining competitors (e.g., Alrosa, Rio Tinto, BHP Billiton or Argyle) for delivery in the United States.

The "Indirect Purchaser Class" has two subclasses: the Reseller Subclass and the Consumer Subclass.

You are a member of "The Reseller Subclass" if:

- You are a person or business residing in the United States on October 1, 2007,
- You purchased gem diamonds or diamond jewelry from someone other than De Beers or one of its competitors, in the United States or for delivery in the United States, between January 1, 1994 and March 31, 2006, and
- You purchased the gem diamonds or diamond jewelry for resale.

For example, Reseller Subclass members include diamond jewelry manufacturers and retail jewelry stores.

You are a member of "The Consumer Subclass" if:

- You are a person or business residing in the United States on October 1, 2007,
- You purchased gem diamonds or diamond jewelry from someone other than De Beers or one of its competitors, in the United States or for delivery in the United States, between January 1, 1994 and March 31, 2006, and
- You purchased the diamonds or diamond jewelry for your own use or as a gift, but not for resale.

As used here, the United States means the 50 states, the District of Columbia, Puerto Rico and the U.S. Virgin Islands.

What Does The Proposed Settlement Provide?

De Beers has agreed to pay \$295 Million to settle the class actions ("the Settlement Fund"). The Settlement Fund will be divided as follows:

- The Direct Purchaser Class will receive \$22.5 Million.
- The Reseller Subclass will receive about \$137.1 Million.
- The Consumer Subclass will receive about \$135.4 Million.

The Settlement Fund is earning interest. The Settlement Fund will be reduced prior to distribution by taxes on the interest, plus other charges, such as attorneys' fees, out-of-pocket expenses of the lawsuits, and costs of administering the claims process, that will be determined by the Court.

The amount you will receive will depend on the total number of claims that are made. Because of the cost to administer checks, if you are a Consumer whose payment amount is less than \$10, or a Reseller whose payment amount is less than \$25, you will not get a payment check.

The Proposed Settlement also provides for an Injunction that prohibits De Beers from engaging in certain conduct that violates federal and state antitrust laws.

Who Represents You?

The Court has appointed attorneys to represent the Classes. You do not need to pay them. Class Counsel will ask the Court to award them a fair and reasonable fee not to exceed 25% of the total recovery. They will also request reimbursement of their costs, and incentive awards for the named plaintiffs (those individuals and corporations who initiated the litigation against De Beers). The awards that the Court makes will be deducted from the Settlement Fund before it is divided among the Class members.

You may hire your own attorney. However, you will be personally responsible for that attorney's fees and expenses. You may also represent yourself, provided you are not a corporation.

What are Your Legal Rights?

You have a choice whether or not to stay in the Classes.

- If you do not want to be part of the Proposed Settlement, you must exclude yourself, in writing, postmarked by **March 4, 2008**. Excluding yourself will allow you to bring your own claims against the Defendants but will prohibit you from submitting a claim against the Settlement Fund.
- If you stay in the Classes, you will not be able to sue De Beers for any of the claims in this lawsuit in the future. However, you can file a claim to get a payment from the Settlement Fund. Your claim must be postmarked by **May 19, 2008**.

If you stay in the Classes, you may object to or comment on any part of the Proposed Settlement. Your objection/comment must be written and postmarked by **March 4, 2008**. You may also request in writing to speak at the Final Approval Hearing, which will be held on **April 14, 2008**, at 10:00 a.m. in Courtroom 8, U.S. P.O. & Courthouse Bldg., Federal Square, Newark, NJ 07101. At that time, the Court will decide whether to approve the Settlement as fair, reasonable, and adequate, what to award Plaintiffs' Counsel as reasonable fees and reimbursements, and whether to award incentive awards to the named plaintiffs.

For More Information on your Legal Rights and Filing a Claim:

Visit: www.diamondsclassaction.com Call: 1-800-760-5431

Or Write: Diamonds Claims Administrator, P.O. Box 9432, Minneapolis, MN 55440-9432



This ankh-shaped mirror case of gold-sheathed wood was found in Tut's tomb.

NG EXHIBITS

Traveling Treasures

After drawing record-breaking crowds at museums in Los Angeles, Fort Lauderdale, Chicago, and Philadelphia, National Geographic's exhibit



Tutankhamun and the Golden Age of the Pharaohs has landed in London. More than 130 artifacts—some

never before seen outside Egypt—are on display through August 2008 at the O2 exhibit hall, including the golden diadem found crowning Tut's mummy. Exclusive to the London venue is a special gallery dedicated to British archaeologist Howard Carter, who discovered Tut's tomb in 1922.

ANCIENT EGYPT, MODERN CROWDS

Exhibit attendance on tour

- Los Angeles: 937,613
- Fort Lauderdale: 707,534
- Chicago: 1,044,743
- Philadelphia: 1,300,700



The *Whydah* carried gold.



On the Trail of Pirate Treasure

During a violent storm in 1717, the flagship of pirate captain Black Sam Bellamy, the *Whydah*, sank off the Massachusetts coast. It was carrying more than four tons of gold. In 1984 the wreck was finally discovered by salvager Barry Clifford, a Cape Cod native who'd heard the tales of the doomed ship since he was a boy. Though Clifford has spent the past 23 years diving on the wreck—the first fully authenticated pirate ship found in U.S. waters—he still hasn't found the gold. But the wreck has yielded other treasures. Watch the National Geographic Channel documentary *The Pirate Code* to learn more.

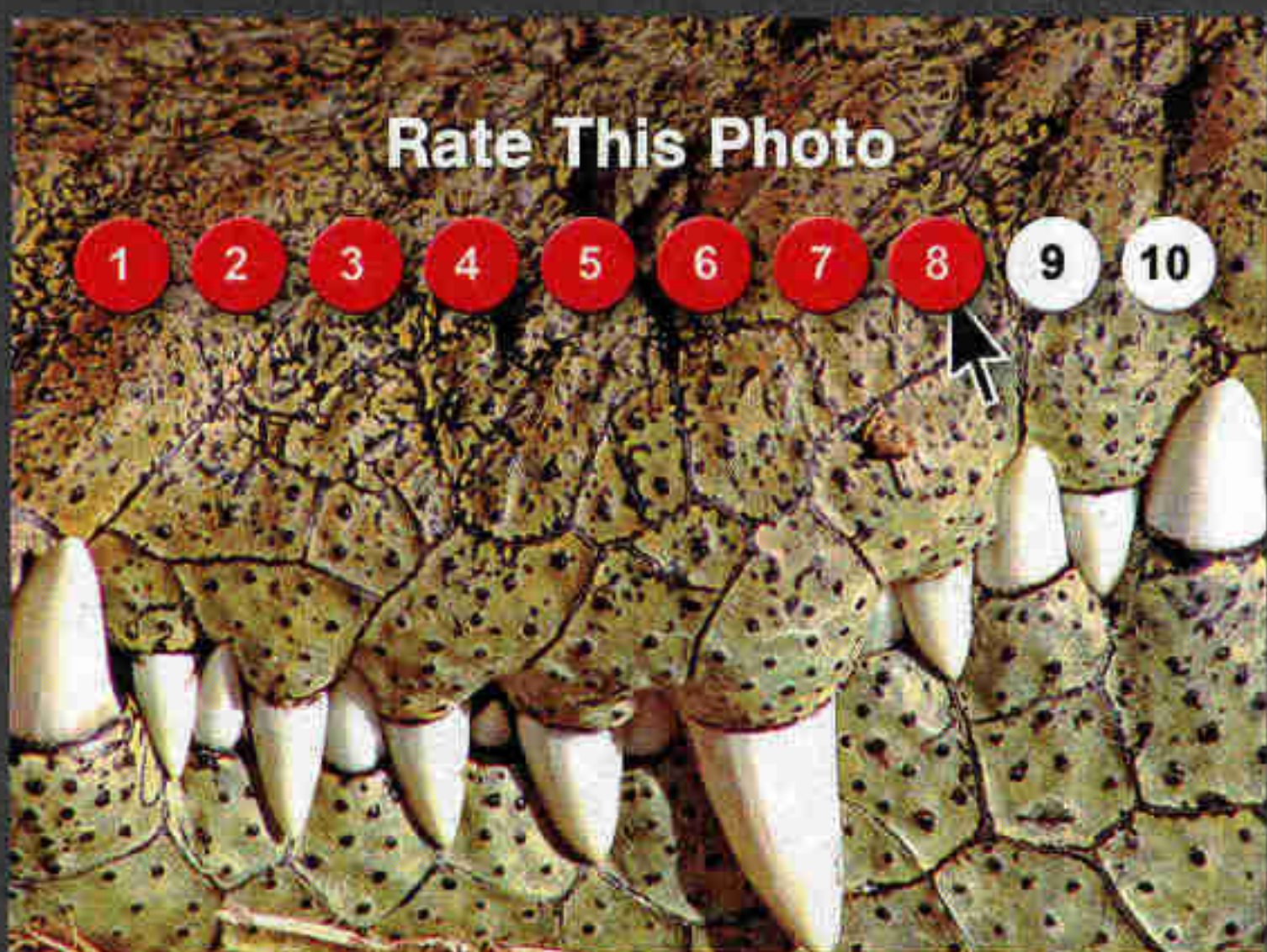
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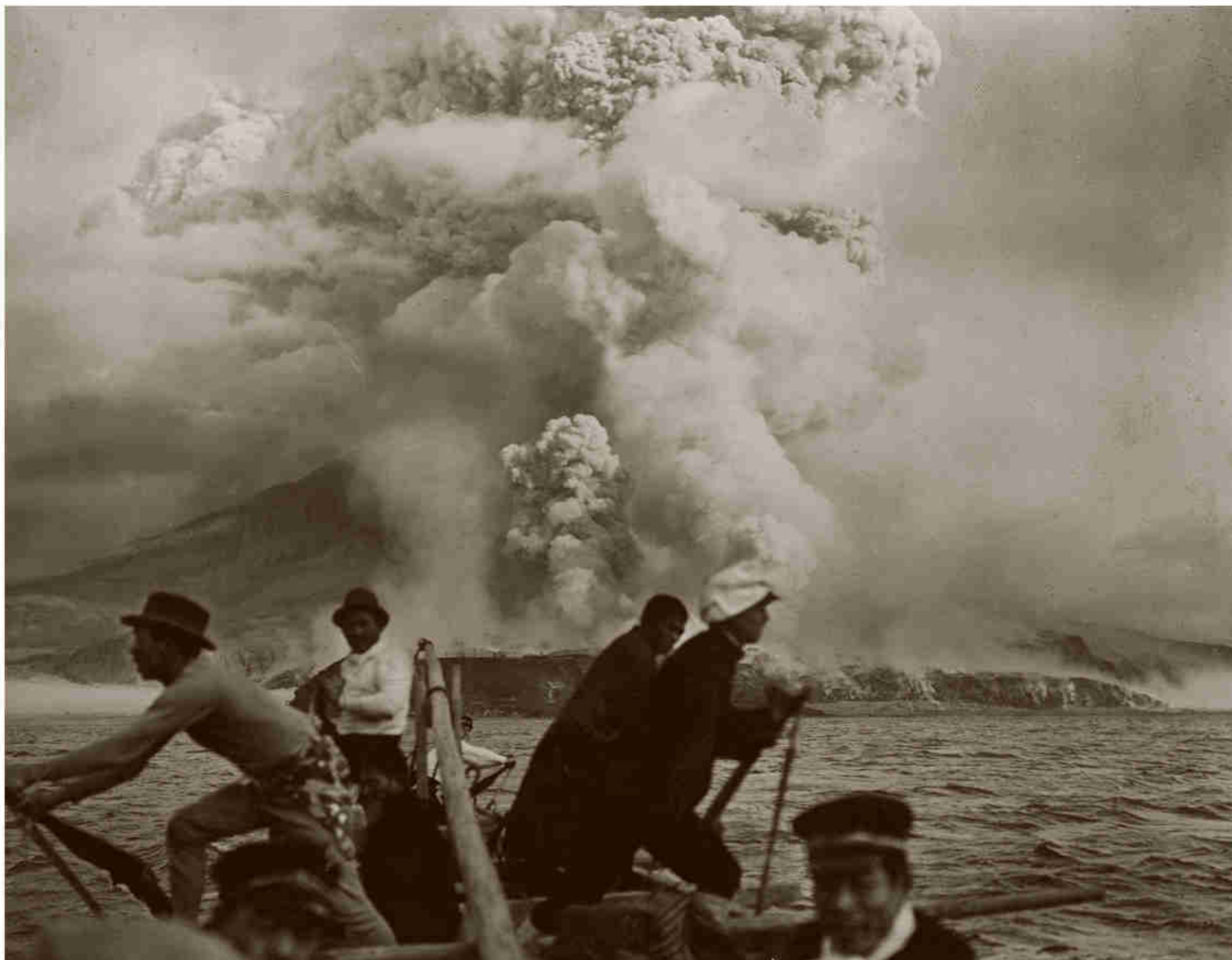


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The Heat of the Moment An exploring party speeds away from Sakurajima on the third day of that Japanese volcano's January 1914 eruption. This photo, along with one of the same group gazing into a lava flow with "handkerchiefs over the faces to protect throats from hydrochloric acid fumes," appeared in the April 1924 *National Geographic*. This eruption—the largest ever in Japan—came as no surprise. The ground around the volcano had rumbled for days; in the nearby city of Kagoshima, 417 earthquakes were recorded in the 30 hours before the mountain blew its top. Sakurajima's first recorded eruption occurred in A.D. 708. It still belches dangerous gases and rains ash on a regular basis, and is one of the most active volcanoes on Earth. —Margaret G. Zackowitz

👉 **Flashback Archive** Find all the photos at [ngm.com](https://www.nationalgeographic.com/flashback).

PHOTO: OSAKA MAINICHI SHIMBUN, NATIONAL GEOGRAPHIC IMAGE COLLECTION

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